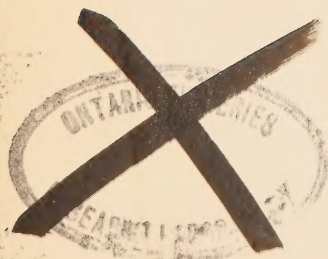




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DOMINION OF CANADA

SEVENTH

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ANNUAL REPORT

OF THE

DEPARTMENT OF FISHERIES

(Seventieth Annual Fisheries Report
of the Dominion)

FOR THE YEAR

1936-37



OTTAWA

J. O. PATENAUDE, I.S.O.

PRINTER TO THE KING'S MOST EXCELLENT MAJESTY

1937

*To His Excellency the Right Honourable Baron Tweedsmuir of Elsfield, P.C.,
G.C.M.G., C.H., Governor General and Commander-in-Chief of the
Dominion of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit herewith, for the information of your Excellency and the Parliament of Canada, the Seventh Annual Report of the Department of Fisheries, being the Seventieth Annual Fisheries Report for the Dominion.

I have the honour to be,
Your Excellency's most obedient servant,

J. E. MICHAUD,
Minister of Fisheries

DEPARTMENT OF FISHERIES,
OTTAWA, April 6, 1937.

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DEPUTY MINISTER'S REPORT

To the Hon. J. E. MICHAUD, M.P.,
Minister of Fisheries.

SIR,—I have the honour to submit the Seventh Annual Report of the Department of Fisheries, which is the Seventieth Annual Report on the fisheries of Canada, and is for the fiscal year ended March 31, 1937. Among the subjects referred to in the report are the following:—

- Results of Commercial Fisheries Operations in the Calendar Year 1936.
- Export and Import Trade in Fisheries Products.
- Action to Expand the Demand for Fisheries Products.
- Direct Aid to Fishermen.
- Fish Culture.
- Inspection of Fisheries Products.
- Instructional Services.
- Atlantic Coast Oyster Culture.
- Pelagic Sealing Receipts.
- Fishing Bounty Payments.
- The Work of the International Fisheries Commission, or Pacific Halibut Commission.

The Work of the North American Council on Fishery Investigations.

The appendices include:—

- Reports of the Chief Supervisors of Fisheries.
- Report on Fish Inspection and Technical Instruction to Fishermen.
- Report of the Fish Culture Branch of the Department.
- Report of the Fisheries Engineer.
- Summary of the Work of the Biological Board of Canada.
- Report on Oyster Culture Work in 1936.
- Report on the Inspection of Canned Salmon.
- A Statement of Fisheries Revenue and Expenditure for the Fiscal Year 1936-37 and a Summary of Revenue and Expenditure by Provinces, for the Period 1867 to 1936-37.
- A Summary Showing the Number of Licences issued in 1936.
- A Summary Showing the Number of Lobster Fishing Licences Issued Each Year since 1928.

REVIEW OF THE FISHERIES FOR THE CALENDAR YEAR, 1936

The catch of fish and shellfish of all kinds for the whole Dominion of Canada during the year 1936 amounted to 1,108,827,900 pounds, with a marketed value of \$39,165,055. In the preceding year the landings of all varieties came to 953,201,600 pounds with a marketed value of \$34,427,854. The ocean contributed 1,027,485,700 pounds of the catch for this year and this quantity had a marketed value of \$32,951,504. In the inland waters the total catch was 81,342,200 pounds and the marketed value \$6,213,551.

Increased catches and higher values were noted in all of the sea fishing districts, while the only two inland areas to show decreased returns were the Yukon territory and inland Quebec.

Major Fisheries.—The quantity of salmon taken during the year was 202,970,400 pounds, or an increase of 20,549,900 pounds, while the marketed value of \$13,867,513 showed an increase of \$1,327,206. From the standpoint of value

salmon is the chief commercial fish in Canada with lobsters coming second and cod third. The year's catch of lobsters was 28,327,300 pounds, having a marketed value of \$4,383,428, which meant a reduction of 3,669,600 pounds in quantity taken as compared with the 1935 production, but an increase of some \$4,500 in value. There were 169,997,400 pounds of cod taken with a marketed value of \$3,331,750. Both catch and value were greater than in 1935, the former by 16,082,400 pounds and the latter by \$573,610. The whitefish catch taken altogether in inland waters amounted to 14,460,300 pounds and had a marketed value of \$1,525,700—a slight decrease in catch but a slight rise in value.

Capital Investment and Personnel.—The investment in boats, vessels, nets and other equipment and gear for use in taking and landing the catch was \$27,218,025. The investment in buildings, machinery and equipment on shore for canning, curing and other processing operations was \$18,476,823. The total investment, \$45,694,848, increased by \$2,076,960 over the 1935 figures. The investment in processing plants and equipment was mostly in establishments in sea fishing areas. The capital in use in primary operations was \$22,544,456 in the sea fisheries and \$4,673,569 in inland fisheries. The capital investment in each of these cases was greater than in 1935.

More persons were employed in catching and landing fish than in 1935 and more were at work in the processing plants. Altogether the number of persons employed was 86,845, of whom 71,735 were at work in primary operations and 15,110 in the processing plants. Of the number engaged in primary operations 58,371 were in the sea fisheries and 13,364 in inland areas.

Table I, below, shows the marketed value of the 1936 production by provinces, and gives also the figures for each of the four preceding years. In table II, the marketed value figures for the sea and inland fisheries, respectively, for 1936 are shown.

TABLE I

	1936	1935	1934	1933	1932
	\$	\$	\$	\$	\$
Nova Scotia.....	8,905,268	7,852,899	7,673,865	6,010,601	6,557,943
New Brunswick.....	4,399,735	3,949,615	3,679,970	3,000,045	2,972,682
Prince Edward Island.....	953,029	899,685	963,926	842,345	988,919
Quebec.....	2,108,404	1,947,259	2,306,517	2,128,471	1,815,544
Ontario.....	3,209,422	2,852,007	2,218,550	2,089,842	2,147,990
Manitoba.....	1,667,371	1,258,335	1,465,358	1,076,136	1,204,892
Saskatchewan.....	367,025	252,059	219,772	186,417	186,174
Alberta.....	309,882	225,741	245,405	144,518	153,789
British Columbia.....	17,231,534	15,169,529	15,234,335	12,001,471	9,909,116
Yukon Territory.....	13,385	20,725	14,625	17,100	20,060
Total.....	39,165,055	34,427,854	34,022,323	27,496,946	25,957,109

TABLE II

	Sea	Inland	Total
	\$	\$	\$
Nova Scotia.....	8,905,268	.....	8,905,268
New Brunswick.....	4,370,404	29,331	4,399,735
Prince Edward Island.....	946,336	.....	953,029
Quebec.....	1,491,269	617,135	2,108,404
Ontario.....	.....	3,209,422	3,209,422
Manitoba.....	.....	1,667,371	1,667,371
Saskatchewan.....	.....	367,025	367,025
Alberta.....	.....	309,882	309,882
British Columbia.....	17,231,534	.....	17,231,534
Yukon Territory.....	.....	13,385	13,385
Total.....	32,951,504	6,213,551	39,165,055

ATLANTIC COAST SEA FISHERIES RESULTS*

The following table shows the total catch of sea fish and shellfish by provinces during the past two years:—

	1936	1935
	lb.	lb.
Nova Scotia.....	265,092,200	235,357,700
New Brunswick.....	158,645,000	138,536,900
Prince Edward Island.....	24,813,800	20,891,800
Quebec.....	89,259,400	80,682,900
Total landings.....	537,810,400	475,469,300

* See also "Inland Fisheries" on page 12 for inland New Brunswick and Quebec, and the Eastern Chief Supervisor's report beginning on page 28.

Cod, Haddock, Hake and Cusk, and Pollock.—The total landings of these varieties during the year amounted to 244,925,300 pounds with a marketed value of \$5,028,060. In the preceding year the quantity landed was 216,268,900 pounds and the marketed value \$4,135,460. Cod catch was greater than the combined landings of the other varieties, the catch of 169,187,500 pounds showing an increase of 16,941,600 pounds. Each of the other varieties was also taken in much larger quantity than in 1935, the catches being as follows,—haddock, 40,301,000 pounds, hake and cusk, 22,802,300 pounds, and pollock, 12,634,500 pounds. Cod and haddock are taken in the largest quantities by Nova Scotia fishermen. Quebec, second among the cod producing provinces, had a catch last year of almost 42,000,000 pounds as compared with 108,000,000 pounds for Nova Scotia. The landings of haddock in Nova Scotia amounted to 39,184,800 pounds, an increase of 3,500,000 pounds. New Brunswick showed a catch of 6,080,300 pounds of hake and cusk, a slight increase, while the pollock catch for the same province was 5,113,500 pounds. Nova Scotia pollock catch, of 7,521,000 pounds, represents an increase of fifty per cent. Pollock are not taken in the waters off Prince Edward Island or Quebec.

The year brought another reduction in the output of dried fish, notwithstanding the increase in the aggregate catch of cod, haddock, hake and cusk, and pollock, the species which are used in the dried fish trade. Out of the total catch slightly less than 70,500,000 pounds went into the production of dried fish (exclusive of boneless fish) as against approximately 86,869,000 pounds in 1935, and as it takes about 300 pounds of fresh fish to produce 100 pounds of dried the 1936 pack of the latter product was only 23,496,000 pounds, roundly stated, as compared with 28,956,000 pounds in the earlier year. There was a sharp increase in the poundage that went into the fresh fish trade. All told, the quantity of cod, haddock, hake and cusk, and pollock used fresh during the year, including the quantity marketed in the form of fresh filets, was 78,322,000 pounds—round figures again—while in 1935 the figure was only slightly more than 54,838,000 pounds. The percentages of the catches used fresh and used for producing dried fish, respectively, in the two years were as follows: Used fresh—1936, 32 per cent, 1935, 25 per cent; used in producing dried fish, exclusive of boneless fish—1936, 29 per cent, 1935, 41 per cent.

Most of the dried fish put up is dried cod and Nova Scotia is the largest producer. The pack of dried cod in Nova Scotia during the year decreased by more than a million pounds to 11,712,600 pounds. In Quebec, the next largest producer, only 5,820,900 pounds were packed, which meant a decline of more than 2,000,000 pounds from the preceding year's figures. Total production of dried pollock on the coast increased by more than a million pounds, reaching

3,115,800 pounds. While dried hake production decreased in the aggregate, there was a gain in Prince Edward Island, but the island output was not large, slightly under 189,000 pounds.

Herring, Mackerel and Sardines.—Increased landings of all three of these species were reported, with a catch of herring, 118,083,700 pounds, showing the largest gain, 16,350,000 pounds. The mackerel catch of 22,763,800 pounds increased by 6,710,000 pounds. Both herring and mackerel are taken in each of the Atlantic coast provinces, with New Brunswick having the largest landings of herring in 1936, or 52,162,000 pounds, and Nova Scotia the largest catch of mackerel, 19,061,600 pounds. Larger landings of herring were made in each province, while the mackerel catch was greater everywhere except in Quebec where the quantity taken, 1,616,400 pounds, was less than half that of 1935. Sardines are taken in New Brunswick and Quebec but it is on the Bay of Fundy shore of the former that the large catches are taken in weirs. The quantity landed there in 1936 was 49,273,600 pounds, an increase of 11,773,800 pounds. The greater part of the catch is canned in the area where landed, or sold to canneries across the border in Maine. The year's pack of 393,854 cases in New Brunswick went in large part into export trade, Canadian sardines being in firm demand in numerous overseas British countries, as well as in other markets abroad. The marketed value of the sardine catch was \$1,597,192 while the marketed value of the three varieties, sardines, mackerel, herring, amounted to \$3,250,915, an increase of \$490,287.

Flounders, Halibut and Swordfish.—Increased landings were reported in the flounder and halibut fisheries but the catch of swordfish diminished. Flounders are taken in the waters of each of the Atlantic provinces, halibut in all but Prince Edward Island areas, and swordfish off Nova Scotia only. The catch of flounders was 874,500 pounds, most of which, 661,600 pounds, was reported from Nova Scotia. Of the total catch of halibut, 3,255,000 pounds, Nova Scotia was credited with 3,104,400 pounds. The latter figure represents an increase of 200,000 pounds. The marketed value of halibut was \$401,431 while the 1,785,300 pounds of swordfish taken were valued at \$230,676.

Salmon and Other River Spawning Fish.—The catch of salmon, 3,193,100 pounds, was slightly less than in the previous year when 3,270,500 pounds were taken. New Brunswick, where 1,657,400 pounds were landed, was the only province to show an increased catch, although Nova Scotia's catch of 601,900 pounds was only 11,000 pounds less than in the year before. Quebec's catch was 931,700 pounds, compared with 1,053,600 pounds, and that taken by Prince Edward Island fishermen amounted to 2,100 pounds. The total marketed value of the salmon catch for the coast was \$442,496, compared with \$406,246 in 1935. (In New Brunswick and Quebec salmon are taken commercially in the inland fisheries as well as in the sea fisheries but, of course, the results of inland fishing have not been taken into the reckoning in these paragraphs). Smelts and alewives both showed increased catches, especially the former, with each of the provinces reporting more smelts taken. In New Brunswick there was a large increase in the catch of alewives but in Nova Scotia and Prince Edward Island there were decreases. Alewives are not taken in Quebec. The catch of smelts, 9,300,700 pounds, had a marketed value of \$640,222 while in 1935 there were landings of 7,729,900 pounds and a marketed value of \$570,745. By provinces, the catches of smelts were,—Nova Scotia, 768,000 pounds, New Brunswick, 6,387,500 pounds, Prince Edward Island, 1,184,300 pounds, and Quebec, 960,900 pounds. The new Brunswick catch represents an increase of more than a million pounds. The greater part of the catch of alewives was landed in New Brunswick where 6,112,200 pounds, out of a total catch of 8,817,300 pounds, were taken. The Nova Scotia catch was 2,670,700 pounds and that of Prince Edward Island

34,400 pounds. The New Brunswick catch represents an increase of 1,298,300 pounds. The marketed value of the catch for the three provinces was \$92,654, a slight decrease from the previous year.

Lobsters.—The catch of lobsters for the coast was 28,327,300 pounds with a marketed value of \$4,383,428. Notwithstanding a drop in the catch, the value shows an increase due to higher values for both the used fresh and the canned. The catch in the province of New Brunswick was the only one to show an increase, each of the other provinces showing reduced catches. The reduction in landings was largest in Nova Scotia where there was a drop of 3,174,500 pounds.

Statistics showing the catch of lobsters, the quantity canned, shipped in shell, meat and tomally for the different provinces for the years 1936, 1935, 1934, and 1933, will be found in the following tables:—

CATCH

	1936		1935		1934		1933	
	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$		\$		\$
Nova Scotia.....	145,091	2,570,274	176,836	2,732,872	184,590	2,487,633	176,858	1,884,715
New Brunswick...	56,499	916,850	54,831	818,699	65,073	812,045	74,940	830,363
Prince Edward Island.....	59,286	614,789	63,876	605,107	76,582	674,186	91,547	591,801
Quebec, including Magdalen Ilds...	22,397	281,515	24,426	222,064	35,747	295,900	31,571	217,476
(Magdalen Ilds)	16,696	251,426	21,707	193,765	30,343	240,640	26,776	175,545
*Totals.....	283,273	4,383,428	319,969	4,378,742	361,992	4,269,764	374,916	3,524,355

SHIPPED IN SHELL

	Cases	\$	Cases	\$	Cases	\$	Cases	\$
Nova Scotia.....	73,158	1,535,573	90,840	1,652,082	91,418	1,365,094	84,271	1,087,770
New Brunswick...	19,750	375,899	20,537	381,092	22,135	311,446	27,286	348,473
Prince Edward Island.....	2,743	35,939	2,991	32,430	3,546	38,704	9,568	71,258
Quebec, including Magdalen Ilds..	7,134	86,276	783	8,200	5,827	54,273	2,800	25,525
(Magdalen Ilds.)	5,842	72,668	.....	.....	3,468	30,709	589	3,611
* Totals.....	102,785	2,033,687	115,151	2,073,804	122,926	1,769,517	123,925	1,533,026

QUANTITY CANNED

	Cases	\$	Cases	\$	Cases	\$	Cases	\$
Nova Scotia.....	37,690	960,621	46,863	1,021,258	50,553	1,036,487	50,729	754,590
New Brunswick...	20,428	512,055	18,275	404,260	23,815	477,999	26,417	454,424
Prince Edward Island.....	22,345	563,286	25,170	556,596	30,214	624,771	32,895	512,138
Quebec including, Magdalen Ilds...	7,639	194,005	9,597	213,519	11,562	241,417	12,021	191,781
(Magdalen Ilds.)	6,927	177,714	8,656	193,615	10,097	209,907	10,730	171,914
* Totals.....	88,102	2,229,967	99,905	2,195,633	116,144	2,380,674	122,062	1,912,933

* Totals are for the four Provinces.

DEPARTMENT OF FISHERIES

TOMALLEY

	1936		1935		1934		1933	
	Cases	Marketed Value	Cases	Marketed Value	Cases	Marketed Value	Cases	Marketed Value
		\$		\$		\$		\$
Nova Scotia.....	3,668	35,512	3,528	33,560	3,418	30,951	2,432	18,988
New Brunswick...	1,174	9,796	617	4,497	479	3,200	236	1,825
Prince Edward Island.....	1,499	15,564	1,358	15,661	1,149	9,386	1,032	6,905
Quebec, including Magdalen Ilds.	128	1,234	36	345	35	210	25	170
(Magdalen Ilds.)	108	1,044	15	150	4	24	4	20
* Totals.....	6,469	62,106	5,539	54,063	5,081	43,747	3,725	27,888

LOBSTER MEAT

	Cwts.	\$	Cwts.	\$	Cwts.	\$	Cwts.	\$
Nova Scotia.....	535	38,568	510	25,972	1,077	55,101	602	23,367
New Brunswick...	382	19,100	577	28,850	388	19,400	553	25,641
Prince Edward Island.....			6	420	29	1,325	26	1,500
Quebec, including Magdalen Ilds.								
(Magdalen Ilds.)								
* Total.....	917	57,668	1,093	55,242	1,494	75,826	1,181	50,508

* Totals are for the four Provinces.

Other Shellfish.—In addition to lobsters, the Atlantic sea fishermen take scallops, clams, oysters, winkles, mussels and crabs but only the first three of these species have much commercial value. The scallop fishery has developed considerably in the past two or three years, particularly in the Bay of Fundy area off Digby, Nova Scotia, where a fairly large fleet of vessels is engaged in dragging operations during the fishing season. The year's total production of scallops was 170,762 gallons (shelled) with a marketed value of \$334,424 which meant increases of 37,537 gallons and \$126,783. Of the total landings 163,305 gallons were made in Nova Scotia and they had a marketed value of \$322,537. Scallops were also taken in New Brunswick, 7,305 gallons, and Quebec, 152 gallons. Oysters are taken in Nova Scotia, New Brunswick and Prince Edward Island waters. The new Brunswick landings of 9,109 barrels were the largest in 1936, and increased by 738 barrels. Prince Edward Island, with 6,742 barrels, showed a drop of 3,272 barrels and the Nova Scotia landings, 4,919 barrels, a decline of 456 barrels. The marketed value of all the oysters landed on the coast came to \$130,235, a small decrease from the previous year. There were 45,914 barrels of clams landed and 2,351 barrels of quahaugs. The greater part of the clams taken are dug in Charlotte county, New Brunswick, and the year's total for this province was 31,231 barrels. Nova Scotia came second with 10,480 barrels. Quebec produced 2,289 barrels and Prince Edward Island 1,914 barrels. The New Brunswick and Prince Edward Island landings were greater than in 1935 while decreases were recorded in the other provinces.

PACIFIC COAST FISHERIES

The catch of all kinds of fish on the Pacific coast amounted to 489,675,300 pounds and the marketed value to \$17,231,534, as compared with 404,178,800 pounds having a marketed value of \$15,169,529 in 1935. The increase in both

catch and marketed value of salmon and herring was mainly responsible for the more favourable showing this year, although returns from a number of the other fisheries helped to swell the total with larger landings and greater marketed value.

Salmon.—The catch was 199,549,900 pounds and marketed value was \$13,387,344, compared with landings of 178,943,100 pounds and marketed value of \$12,099,275 in the previous year. The pack of 1,881,025 cases shows an increase of 352,003 cases, and the value of the pack, \$11,128,636, an increase of \$1,474,739. Chums, pinks and sockeyes were the varieties contributing chiefly to such an increase in the pack. The pack of chums, 597,487 cases, was the largest since 1928, while the pink pack of 591,532 cases was the largest since 1930. There were 415,024 cases of sockeyes put up, the largest pack since 1930, and an increase of 64,580 cases over 1935 production. There was a drop in the quantity of salmon used fresh and also in the mild cured but the quantity of drysalted was slightly larger. The production of salmon oil, 171,326 gallons, was almost three times that of the previous year, and the value was \$38,717 or more than three times the earlier year's total. Meal made from salmon waste was 2,083 tons compared with 806 tons, and the marketed value of \$66,701 showed a corresponding increase.

Herring.—One of the three most important varieties of fish on this coast, herring were taken in increased quantity and the catch of 162,062,500 pounds was greater than that of the previous year by 61,211,800 pounds, and its marketed value, \$1,142,397, was almost double the 1935 amount. While the drysalted pack was for years the main item in the herring trade, the chief interest last year centered in the production of meal and oil. The output of meal, 10,085 tons, almost doubled and the production of oil, 782,499 gallons, was more than double that of the previous year. The marketed values of the two products were \$349,910 and \$200,422, respectively, the former being an increase of 138 per cent and the latter 191 per cent. The drysalted pack was 38,333,700 pounds, as compared with 30,271,000 pounds. A feature of the herring operations was the canning of 51,695 cases. This is much the largest quantity canned since 1919 when 64,000 cases were packed.

Halibut.—The catch, by Canadian fishermen, of 10,591,800 pounds, was only slightly greater than that of 1935 when 10,192,700 pounds were landed. Marketed value, \$1,039,879, showed an increase of \$99,017. Halibut livers sold had a weight of 191,600 pounds and were valued at \$96,311, both totals slightly greater than in the previous year. In addition to the landings from Canadian vessels, there were 6,220,300 pounds of halibut landed in British Columbia by United States fishermen, mostly at Prince Rupert, and shipped to United States markets in bond.

Pilchards.—In the case of pilchards, catch and value alike showed a drop, the former at 88,903,700 pounds and the latter \$667,313. Although these fish are used chiefly in the production of meal and oil, 35,007 cases were canned and had a marketed value of \$102,127. The quantity of meal produced was slightly larger than in 1935 and the 8,715 tons had a value of \$274,063. There was a drop in the quantity of oil extracted, 1,217,097 gallons, with a marketed value of \$290,216.

Other Fisheries.—Ling cod is of next importance to salmon, halibut, herring and pilchards and in 1936 the catch and its value both increased. Catch was 6,893,200 pounds and the marketed value \$392,147. The number of whales taken was 370, which was somewhat greater than in 1935, and the value of the whale products, meal, fertilizer and oil, totalled \$172,201. Grayfish or dogfish are taken for reduction purposes and the value of the oil and meal produced last year, \$69,719, was almost fifty per cent greater than in the year before.

The value of the clams, crabs and oysters brought ashore showed an increase over the previous year but the quantity and value of shrimps decreased by more than half. The number of fur seals taken by Indians, under the Pelagic Sealing Treaty, was 1,888, as compared with 841 in the previous year.

INLAND FISHERIES

Returns show that from the inland rivers and lakes of Canada, including, of course, those of New Brunswick and Quebec, although the sea fisheries results in these provinces are referred to in another part of this report, 81,342,200 pounds of fish were taken by commercial fishermen in 1936, as compared with 73,553,500 pounds in the previous year. The marketed value of the year's catch came to \$6,213,551, as against \$5,252,454. The following table shows the landings of the chief freshwater varieties for the past five years:—

	1936	1935	1934	1933	1932
	lb.	lb.	lb.	lb.	lb.
Whitefish.....	14,460,300	14,745,600	14,461,500	15,213,500	13,847,800
Pickereel (or doré).....	14,563,500	10,954,800	12,251,200	10,627,200	8,949,800
Tullibee.....	5,926,500	3,972,100	4,407,600	4,230,000	4,764,400
Trout.....	7,282,500	6,624,200	5,884,800	5,073,400	5,007,200
Pike.....	5,437,000	4,476,100	3,719,500	4,114,600	4,140,000
Herring.....	5,091,900	3,453,600	3,799,200	3,418,000	3,669,200
Perch.....	3,109,000	7,115,300	7,213,900	4,033,700	6,021,300
Eels.....	2,206,400	2,306,300	2,297,000	2,495,000	1,930,700
Blue pickerel.....	6,899,500	5,123,000	2,432,100	4,216,400	4,061,000
Mullets.....	4,200	329,700	213,900	236,200	400,000
Carp.....	1,777,000	2,102,600	2,132,800	1,854,500	1,806,100
Goldeyes.....	590,200	334,100	330,600	287,600	309,700

Whitefish are the most valuable species taken in the inland waters and the 1936 catch was worth \$1,525,700 as marketed. Ontario production accounted for more than one-half the value total, or \$810,642, although the provincial catch was less than one-half the Dominion aggregate. Saskatchewan took second place so far as value of whitefish production is concerned, with landings in the province worth \$251,012. Catch was larger in each of these provinces than in 1935. In Manitoba, on the other hand, the catch of 2,127,500 pounds was only 56% as large as in the previous year. Whitefish catch and value in Quebec were practically the same as in 1935.

Pickereel catch, 14,563,500 pounds, was valued at \$1,109,397, or second in point of value among fresh water fish. Both the catch and marketed value increased, the former by 3,608,700 pounds and the latter by \$307,575. Manitoba produced the most pickereel and the provincial landings of 10,505,400 pounds showed an increase of 3,287,100 pounds. Blue pickerel, taken in the province of Ontario only, were landed in increased quantities, the catch amounting to 6,899,500 pounds and the marketed value to \$614,055.

Trout, another of the more important fresh water fish, was taken in larger quantity than in the year before and the catch total of 7,297,300 pounds had a marketed value of \$842,738. The former figure shows an increase of 664,800 pounds and the latter an increase of \$74,170. Most of the trout, 6,458,700 pounds, were landed in Ontario.

The catch of eels in inland Quebec was slightly less than in 1935. Some 2,139,900 pounds were landed with a marketed value of \$140,139. Much the greater part of Canada's production of eels comes from the fresh water areas of Quebec.

FOREIGN TRADE GREATER

On both sides of the Dominion's foreign trade account for 1936 the fisheries entries represented more money than in 1935 and the total business in fisheries products which was done with other countries during the calendar year amounted to \$28,200,000. On the export side there was an increase of \$520,000, which brought sales up to \$25,358,000. Imports entered for domestic consumption were worth less than one-ninth as much as the exports but their total value of \$2,809,000 showed a gain of \$304,000. Round figures have been given in all these cases and it is also to be noted that in calculating totals the trade in fish oils, which in some trade records is shown separate from the business in other products of the fisheries, has been taken into the reckoning.

Enlarged business with the United States brought about the net gain in export value. Total sales to the republic amounted to \$12,910,000 and the increase of \$2,595,000 which they showed was sufficient to offset decreases in the business the Dominion did with the rest of the world and to leave half a million dollars on the right side of the comparison. Exports to the United Kingdom, which ranks second only to the United States among Canada's customers for products of the fisheries, were smaller in aggregate volume and value than they had been in 1935, with the value decrease reaching \$993,000. Shipments to countries other than the United Kingdom and the United States were \$1,082,000 below the value level of the preceding year.

Most of Canada's fisheries exports to the United States consist of fresh and frozen fish and it was increase in sales of products in this classification which was chiefly responsible for the rise in trade with the Republic in 1936 and, in turn, for the net gain in total fisheries export business for the year. Fresh and frozen fish shipped out from Canada during the year were valued, all told, at \$11,143,000 and \$10,200,000 of this business was done with the United States, which increased its purchases by \$2,104,000. Haddock, halibut, lobsters, salmon, smelts, swordfish, and whitefish, to cite important examples, were marketed across the border in larger quantities than in 1935 and brought increased dollar returns. The major dollar gains were in the trade in live lobsters, salmon, whitefish, and haddock, with the increases running from \$138,000, in the case of haddock, to \$459,000 in the case of lobsters. In value, \$2,100,000, the live lobster shipments were first, by a wide margin, among the different fisheries products which Canada sent to United States markets; in quantity, 9,886,000 pounds, the shipments exceeded those for 1935 by 681,000 pounds.

Fish oil exports to the United Kingdom showed the substantial value increase of \$115,000 but each of the principal other products which our fishing industry sells to Britain—canned salmon, canned lobster, frozen salmon, and frozen halibut—was purchased in lessened quantity than in 1935, and this latter condition explains the net decrease of \$993,000 which reduced to \$5,751,000 the total business done in the British market during the year. True, Great Britain continued to be the largest single buyer of Canadian canned salmon and canned lobster but the value of its 1936 salmon purchases decreased by \$698,000 and the value of lobster purchases by \$321,000. In explanation of these two declines it may be pointed out that in the United Kingdom, as in some other markets, the canned salmon from the Dominion has to meet very severe competition from the outputs of several non-British countries, while a product which has competed sharply with Canadian canned lobster in recent years is canned crayfish, a cheaper commodity, which is sometimes called rock lobster or spiny lobster and is shipped to Britain from several sources. The addition of crayfish to the competition offered canned lobster by canned crabs imported into Britain has made the marketing problem of our lobster packers still more difficult.

Taking export trade as a whole, the year brought a betterment of \$1,997,000 in the business of fresh and frozen fish, a small gain, \$145,000, in the business in

fish oils, and an increase of \$315,000 in the sales of miscellaneous fisheries products. On the other hand, however, the value of the canned fish marketed abroad was only \$9,275,000, as compared with \$10,475,000 in 1935, and the exports of products in the "salted, dried, smoked, or pickled" classification brought a return of \$3,603,000, as compared with \$4,341,000.

Among the canned goods sardines showed some rise in export value, although in volume there was a very slight decrease. Trade in both of the principal products in this classification, salmon and lobster, was less satisfactory, however, than in 1935. So far as canned lobster was concerned, it was the large decrease in United Kingdom purchases that brought the year's total business \$194,000 below the mark for the preceding year; sales to other markets, principally the United States, Sweden, and France, increased by about \$127,000. In the case of canned salmon there was improvement in the trade with such countries as New Zealand and France but there was the big drop already referred to, \$698,000, in the value of the shipments to Great Britain, a decrease of \$407,000 in the Australian trade, and several other declines, with the net result that total business, \$6,367,000, showed a reduction of \$1,027,000.

Much the greater part of the Dominion's output of dried, smoked, and pickled products must find sale abroad and marketing conditions have been very unsatisfactory for some few years past. This state of affairs continued in 1936 and Canada's sales of the products in question decreased by \$738,000, as already shown. More than half of this reduction, or \$463,000, was in the dried codfish trade. The figures are significant as a further indication of the very serious condition which has developed in recent years for the branch of the Canadian fishing industry concerned with the production of dried and pickled fish.

So far as imports for the year were concerned, the items contributing mainly to the net increase in total value were cod liver oil from the United States, the United Kingdom, and Newfoundland, canned lobster from Newfoundland, canned crabs from the United States, fresh salmon from Newfoundland and Alaska, and seal oil from Newfoundland. As a matter of fact, there is little doubt that much of the importation from Newfoundland each year ultimately finds its way into re-export channels. In the case of fresh salmon imports the larger part of the 1936 increase was due to a sharp rise in receipts from Alaska and most of this Alaskan fish was used as the raw material of British Columbia canneries. The outstanding import reduction of the year was a very large drop in the quantity and value of whale oil but whale oil importation figures in 1935 had been abnormally high.

EXPANDING FISH DEMAND

Among the major activities of the department during the fiscal year was an effort to expand the demand for the fishermen's products by means of large scale publicity undertakings in Canada and the United Kingdom. It was thought best to concentrate upon these markets at the time since it seemed likely that to attempt to spread effort over a larger number of territories would mean diminished effectiveness everywhere. A comparatively low per capita consumption of fish foods within the Dominion indicated the fruitful possibilities of an advertising campaign in Canada. Great Britain as Canada's largest single market overseas, naturally suggested itself as an area where increased selling effort might well be undertaken, especially at a time when the "Canada Calling" campaign being carried on by the High Commissioner for the Dominion was drawing the attention of British consumers to Canadian products generally.

The chief step in the domestic program was a nation-wide advertising campaign in which space was taken in practically all classes of publications. The campaign was on a far bigger scale than anything of the kind previously undertaken on behalf of the Canadian fishing industry under either public or private auspices and entailed a cost of something like \$125,000. The first

advertisements were published at the close of September and they were followed by a steady succession of others which continued until the end of the fiscal year, save for a break in December.

To reach consumers generally, advertisements were placed in daily newspapers, weekly newspapers, national magazines, farm journals, labour papers, religious papers and some publications of miscellaneous types. English and French periodicals alike were used, as well as some issued in other languages. Every part of the country was covered. In all of these advertisements emphasis was laid upon the nutritive and health value of sea fish, freshwater fish and shellfish, their tastiness, the wide variety of choice available to Canadian consumers from Canadian producing sources and upon the point that this wide range of variety makes it unnecessary for the people of the Dominion to purchase imported fish foods.

While most of the advertising was placed in papers and magazines circulating among the general public, space was also taken in certain groups of trade papers with a view to reaching particular classes. In an endeavour to increase the use of Canadian fish and shellfish by public dining rooms a special series of advertisements was inserted in hotel and restaurant journals. Publications circulated among food merchants were used so that dealers might be better informed regarding fish foods and their interest in fish marketing increased. In addition to being reached through the food trade papers, the provision dealers and grocers were reached also by special pieces of publicity material which were distributed to more than 8,000 of these merchants in different parts of the country at several stages of the campaign.

Results from advertising are never fully observable during an extensive campaign or immediately after its close. Some may be quickly apparent, others may be spread over a considerable period of time, especially when so wide a territory as all Canada is concerned, and complete and accurate appraisal of them is difficult. There is the further point, of course, that the measure of results from a campaign such as the department carried on must depend in large part upon the alertness and energy with which the individual dealers in the trade take advantage of the enlarged selling opportunity opened up to them by the advertising effort. No amount of advertising will do very much for the producer or dealer who is not himself alert and energetic to seize opportunity or, at all events, it will not accomplish very much for him in the way of continuing benefit. However, so far as the departmental campaign is concerned, there has been testimony to its effectiveness from the Canadian Fisheries Association, a national organization representing important commercial fishing interests in all the provinces, and from representative individuals in the fishing industry and the fish trade in various parts of the Dominion. Definite sales increases, attributed to the campaign by the merchants concerned, were reported in a number of instances. In other cases it was stated that abnormal marketing conditions which arose in some localities during the winter months and would otherwise have affected business very seriously were counteracted by the steady campaign of advertising.

The one yardstick by which the department itself could measure the effectiveness of the advertising was the flow of requests for fish cook books which reached it. Each one of the advertisements appearing in the daily and weekly newspapers, national magazines, farm papers, etc., included a coupon entitling the reader to a copy of the departmental cookery booklet. Approximately 80,000 individual requests for booklets were received during the life of the campaign. In addition, there were numerous requests from women's institutes, farmerette clubs and other organizations of women asking that copies of the cook book be sent to each of their members. In numbers of cases the heads of domestic science schools and teachers of domestic science classes in other schools likewise asked for supplies of the book for distribution among their pupils. Requests

from individuals and organizations and schools are still being received. These facts make it clear that the advertisements in the campaign were very widely read by the women of the country, and it was the women, of course, the housewives and future housewives, whose increased interest in fish foods was most to be sought. It is also to be noted that another apparent effect of the campaign has been to arouse more interest in the fishing industry and fisheries products among the school teachers and school pupils of the country. During the progress of the campaign there was a noticeable increase in the number of requests for information regarding Canada's fisheries which reached the department from school children.

While the press advertising campaign was the main undertaking in the department's endeavour to expand the demand for the fishermen's products within Canada, several other steps of importance were taken. Fish cookery demonstrations in different centres were continued and in the course of the year an additional demonstrator-lecturer was placed in the field. The demonstration work was done in the central provinces because it is in these areas, where the largest internal markets are to be found, that there was most opportunity to bring about increased demand for fish foods, but it is the intention that the demonstrators will visit other parts of the country from time to time so that the women in these latter communities may also be able to take advantage of their suggestions and knowledge.

Another step taken during the year was to obtain a motion picture, with sound, illustrative of the fishing industry of the Dominion and indicative of the merits of Canadian fish foods and to arrange for its presentation in at least 400 Canadian theatres during the next few months. Arrangements are also being made under which this picture, issued in English and French versions, will be shown by the travelling theatre car operated by the Canadian Forestry Association in Western Canada. It will likewise be used by the department's demonstrator-lecturers in some of their work.

Overseas, the department gave financial assistance to plans made through the Canadian Commercial Attaché in France for a display of canned salmon from the Dominion at the International Exposition in Paris but, as already indicated, the principal action taken in the overseas field was in Great Britain. For a time consideration was given to the question of undertaking a distinct departmental advertising program in Britain but it was decided that the most effective action possible under the circumstances was to co-operate with the High Commissioner at London in the "Canada Calling" campaign. The department's course was to transfer \$25,000 from its funds to the High Commissioner's Office at London on the understanding that it would be used solely for the purpose of supplementing the advertising which was to be given Canadian fisheries products under the original plans for the High Commissioner's general campaign. The result of this course was that a more extensive and more intensive effort than would otherwise have been possible was put forth on behalf of Canadian canned salmon and canned lobster, the two principal fisheries products which the Dominion ships to the United Kingdom. Preliminary reports are to the effect that this increased effort was very valuable in drawing more attention to the excellence of the Canadian products and in emphasizing the important point that they are of British origin.

DIRECT AID TO FISHERMEN

While relief is primarily a provincial responsibility, emergent conditions may necessitate emergent action and to assist in meeting conditions of this kind which had developed in a number of fishing communities, Parliament made available to the department for the fiscal year 1936-37 the sum of \$300,000 which was earmarked for use in aiding, "in co-operation with the provinces con-

cerned," in the re-establishment of needy fishermen. Under agreements made with Nova Scotia, New Brunswick, Prince Edward Island and Quebec, where administration of the fisheries is in federal hands in whole or in part, \$200,007.73 were spent by the department from this appropriation in assisting fishermen in these provinces, and additional amounts totalling in the aggregate a like sum were contributed by the provincial governments for the same purpose. In other words, in each of the four provinces the department spent dollar for dollar with the provincial government in direct aid to fishermen who were in need of help to get back on their feet. All told, 6,649 loans averaging \$37.46 and totalling \$249,054.35 were made to fishermen in the Maritime provinces and 22 loans averaging \$1,061.14 to fishermen's associations in the same area, while in Quebec 8,930 grants averaging \$14.29 and totalling \$127,616.12 were made to fishermen.

The fifth and remaining province in which the department has to do with fisheries administration, British Columbia, decided not to share in the undertaking and therefore no agreement was made with it.

In each of the three Maritime provinces the plan adopted was to make short term loans to fishermen and associations of fishermen from a fund created by equal contributions from department and province. In Quebec a similar joint fund was established but it was used in making grants to fishermen, not loans. Administration of the funds was a provincial responsibility in all cases. In the three provinces in which loans were made they were handled through voluntary local committees who worked under the supervision of a central board, both the board and the committees being chosen by the provincial authorities. The rate of interest on loans was subject to the approval of the Minister of Fisheries. A condition of the agreement with each of the provinces which followed the loan plan was that all sums repaid to the provincial government by borrowers should be used by the government for the purpose of making future loans to fishermen. The agreement with Nova Scotia provided for a maximum fund of \$200,000 for use in the province and the agreement with New Brunswick for a like fund. In the case of Quebec the amount was \$150,000. In Prince Edward Island it was \$50,000. In none of the provinces, however, was the maximum required.

The figures relative to the Quebec grants have already been given. In the case of the Maritime provinces the loans were made as follows: Nova Scotia—Loans to fishermen 3,622, average loan \$35.23, total amount lent to fishermen, \$127,614.58; loans to associations, 14, total amount of association loans, \$16,645. New Brunswick—Loans to fishermen, 1,888, average loan \$41.85, total amount lent, \$79,007.35. Prince Edward Island—Loans to fishermen, 1,139, average loan \$37.25, total amount lent fishermen \$42,432.42; loans to fishermen's associations 8, totalling \$6,700.

INSPECTION OF FISHERIES PRODUCTS

Detailed references to fish inspection services carried on under the department during 1936 will be found in appendices of this report but several of the outstanding facts may perhaps well be set out here as giving some idea of the amount of work which was done and what its results indicated as to the quality of Canadian fisheries products. During the year the former Board of Canned Salmon Inspection gave place to the Canned Salmon Inspection Laboratory, which the department established in British Columbia with men of scientific training in charge, and between April 1 and December 31 the laboratory made inspection of samples drawn from 1,823,931 cases of canned salmon. Out of all this great quantity less than 27,000 cases were found to be below the standard required for certification as being "fresh, firm, well packed, and in good merchantable condition" and of this number nearly 22,000 cases were classified

as "Grade B," or, in other words, as sound and wholesome although not up to certificate requirements. Actually only 989 cases were unfit for market and were confiscated under the law. Some 3,700 cases were "tips and tails" and under the inspection regulations, made under the Meat and Canned Foods Act, "tips and tails" are never eligible for certification.

Among Atlantic coast products which are subject to inspection are pickled alewives, pickled herring, pickled mackerel, and hard cured smoked round herring. They are inspected under regulations made under the Fish Inspection Act and the regulations provide that fish which do not come up to specified requirements must be marked by the inspecting officer, "Below Quality." In the course of 1936 the inspectors on different parts of the coast, exclusive of the mainland of Quebec where the fisheries are under provincial administration, examined 78,001 packages of pickled fish (for the most part these "packages" were barrels) and 288,401 barrels of the hard cured smoked herring. Only 879 packages of the pickled products and 20 boxes of the smoked herring were below quality, although some other packages and boxes, comparatively a small number, had to undergo reconditioning before fully meeting the requirements. Inspection, combined with the educational work the department carries on among the fishermen, have been bringing steady improvement in the quality of the pack of pickled and smoked fish. The very small percentage of "Below Quality" fish in the 1936 output is significant of the progress that has been made in raising the standards of production.

Other inspections carried on by departmental officers, under authority of either the Meat and Canned Foods Act or the Fish Inspection Act, include the examination of fish canneries—the grading of lobster canneries is an important branch of canning plant inspection—the inspection of Atlantic oysters, the inspection of dry-salted herring in British Columbia, the inspection of containers for pickled fish, and the inspection of fish curing plants. Details of the work done under these heads during 1936 will be found in several of the appendices. Suffice it to say here that the inspection systems have been extended and made more thorough in the past few years and the improvements which have followed in plants and products are abundantly justifying the course which has been taken.

INSTRUCTIONAL SERVICES

New ground was broken by the department during the fiscal year, so far as the extension of instructional work was concerned, when arrangements were made under which the services of trained workers in the field of adult education were employed to assist the fishermen in certain areas to equip themselves by study and organization for the solution of their problems. Pressing, difficult conditions made the need for assistance of this kind especially desirable in northeastern New Brunswick and it was in that area that the first efforts in the department's new program were put forth under arrangements made with the University of St. Francois Xavier, Antigonish, Nova Scotia, which, through its Extension Department, had already accomplished a good deal in the sphere of adult education among the farmers and miners and fishermen of the eastern counties of Nova Scotia. The university undertook to send trained men from its staff into the different fishing communities of northeastern New Brunswick, form study clubs among the fishermen, help the men to organize, help them to plan sound attack upon their problems. The charge assumed by the department was the actual cost of the work, including the cost of a series of instructional pamphlets for distribution among the fishermen.

The program was set on foot in the latter part of 1936. It has been successful in producing satisfactory results. Approximately 425 study clubs were formed with a total membership of something like 4,000, and the number of clubs continues to increase. In several localities, fishermen's associations

were formed and organization plans were proceeding in some other districts as the fiscal year came to a close. Co-operative lobster canning, which has been successful in different parts of Nova Scotia, was undertaken in several districts. Credit unions were established by the people in one or two of the fishing communities.

The work begun during the past year proved so useful that it is the intention to continue it in the coming fiscal year. Some further action remains to be taken in northeastern New Brunswick, but the program will be extended to other areas where there is need for effort of the same kind in the fishing settlements. It is probable that the next steps taken will be in the Magdalen Islands.

As for several years past, so during 1936 the department sent expert instructors into various Atlantic Coast areas to show the fishermen the best methods of curing cod in pickle, processing boneless fish, and preparing dried cod in what is known as the Gaspé cure. In British Columbia two instructional courses for fishermen were given, one at Nanaimo in November, 1936, and the other at Vancouver in January, 1937. Both courses were arranged for by the Biological Board, and it is interesting to note, as significant of the fishermen's growing appreciation of the importance of the help which the scientist can give them, that requests that the courses be given were made by two organizations of fishermen. Circumstances prevented the board from holding the course for fishermen which it has annually been giving at Halifax in recent years but arrangements were made under which a course of instruction is to be given at the board's new station at Grand River, Gaspé, early this summer. Departmental experts in curing cod, herring and mackerel and in barrel making are to assist in the work of this course.

Further reference to the year's instructional work will be found in Appendix No. 2.

FISH CULTURE

Fish cultural work is carried on by the department in Nova Scotia, New Brunswick and Prince Edward Island, in the east, and in British Columbia, in the west, where administration of the fisheries is a federal function. Operations are concerned with the more important fresh water and anadromous food and game fishes such as Atlantic and sebago salmon and speckled, rainbow, Kamloops, Loch Leven, hybrid and salmon trout in the east; and sockeye, coho and Kennerly's salmon, and steelhead, Kamloops, speckled and cutthroat trout in the west. The operation of the hatcheries located in the National Parks in Alberta is also directed by the Department of Fisheries but at the expense of the National Parks Bureau, Lands, Parks and Forests Branch, Department of Mines and Resources.

During 1936 there were in operation 23 main hatcheries, 8 subsidiary hatcheries, 2 rearing stations, 8 salmon retaining ponds and several egg-collecting stations. The total output for the year was 111,672,401.

A detailed report on fish culture operations during the past year is to be found in Appendix 10 of this report.

ATLANTIC COAST OYSTER CULTURE

There was further noteworthy expansion in 1936 in the oyster farming industry which has been developed in Prince Edward Island as a result of the department's policy of assisting commercial oyster culture in suitable areas in provinces where the oyster areas are under its jurisdiction and a start was made toward the establishment of a similar industry in Nova Scotia. In the other provinces where oysters occur, British Columbia and New Brunswick, the areas are under provincial control, save on one comparatively small strip of the New Brunswick coast where, by a federal-provincial agreement, they were transferred

to the department's hands a year or two ago with a view to having certain investigations and experiments undertaken in the district.

Until 1928 the oyster areas in all four of the provinces were under provincial jurisdiction, although, of course, the oyster fishery, like all other Canadian fisheries, was then, as now, subject to federal regulation, but in that year the Prince Edward Island areas were brought under the control of the department by an agreement between the province and the Dominion. Last year a similar agreement relative to control of the Nova Scotia areas was made. In each case a condition of the agreement was that the department should endeavour to develop commercial oyster growing in the province. Prior to last year, in 1934 and 1935, some preliminary examinations of the Nova Scotia areas had been made, at the request of the province, by investigators working under the department but a thorough study of conditions is always necessary before an oyster farming program can be mapped out anywhere and when the 1936 agreement was made the department at once set intensive research in progress in Nova Scotia. Much of the knowledge previously obtained through the study and actual operations carried on in Prince Edward Island will no doubt be useful in making plans for Nova Scotia but conditions in different localities may vary so greatly that oyster farming cannot prudently be undertaken until an examination of local factors by thoroughly qualified persons has indicated the likelihood of success and has pointed out the best methods of operation to employ. It is encouraging to note, however, that although scarcely any effort to cultivate oysters has yet been made in Nova Scotia the potentialities of the oyster farming industry in the province, as gauged by Dr. A. W. H. Needler, the scientist in charge of the oyster research on the Atlantic Coast, "are much greater than its present development indicates."

Perhaps the most striking fact in connection with Prince Edward Island oyster growing operations in 1936, which are discussed by Dr. Needler in Appendix No. 5 of this report in the course of a full review of the oyster cultural work of the year, is that the number of private "farms" rose to 243, as compared with 138 in the preceding year and only 26 in 1932, the year when the oyster farming program in the province was first actively under way. In total extent, 1,008 acres, the areas under cultivation last year, exclusive of those being farmed by the department itself; were not far short of being twice as large as in 1935. The increase in the number of farms and the increase in the acreage under cultivation are to be credited almost wholly to the Malpeque-Cascumpeque region. Some years ago, quite a time before the beginning of the oyster farming program, Malpeque bay was the main oyster producing section of the province, though the stocks were subsequently almost entirely wiped out, and it is there that the chief development in commercial culture has been taking place since the department began its work in the island. As indicative of future progress it is significant to note that during 1936 the oyster farmers in the Malpeque-Cascumpeque district spent more than \$19,000 on the development of their areas and so that they might build increased yields for subsequent years they planted far more oysters than they removed from the beds for marketing. "The oyster farming industry, as a whole," says Dr. Needler, "is spending now to build up a high production in the future."

Unfortunately, the satisfactory conditions which existed in the Malpeque-Cascumpeque region were not present in 1936 in the other Prince Edward Island section (Rustico, Brackley, Covehead, Tracadie, and Savage bays) where oyster farming had been taken up on a fair sized scale. In that part of the province fair progress had previously been made, though the number of areas brought under cultivation was much smaller than in Malpeque-Cascumpeque waters, and increasing activity was in prospect. Operations were almost completely checked last year, however, by a heavy mortality of oysters. The cause of the

mortality is not yet certain but investigations will be made during 1937 with a view to determining both the cause and the means by which a recurrence of the trouble can be prevented.

FISHERIES INTELLIGENCE

Increased popular interest in the fisheries was made evident during the year by a growing number of requests for information regarding the fisheries resources and fishing industry of the country. The number of requests of this kind had been increasing for several years but during 1936-37 public interest in the fisheries was evidently stimulated by the department's advertising campaign. The advertisements dealt with fish as a food but they also had the effect of drawing attention to fisheries matters generally. A large percentage of the inquiries reaching the department came from school pupils and school teachers. Others came from women desiring information as to methods of domestic fish canning, salting, etc. Others were from newspapers and magazines. In numbers of cases persons engaged in the fishing industry sought information and advice on technical points connected with their operations or asked for market data. Distribution of publications to the correspondents met the situation in many instances but correspondence was very often necessary in order to deal with specific points.

Broadcasting of weather, bait and ice reports to Atlantic coast sea fishermen was again carried on during 1936-37, as for a number of years past. Weather reports were broadcast twice daily throughout the year from Halifax, N.S., Louisburg, N.S., and Saint John, N.B. The messages regarding ice and bait conditions were included in the broadcasts from Halifax and the broadcasts from Louisburg during most of the year. Re-broadcasts of all the reports were made from the departmental ship *Arras* while she was on the fishing banks with the Nova Scotia deep sea fleet. The weather reports were supplied by the federal Meteorological Service and the information regarding bait and ice conditions was collected daily by departmental officers on different parts of the Atlantic coast, telegraphed to the department's office at Halifax and transmitted thence to the broadcasting stations. As has been noted in previous annual reports, a broadcasting service to fishermen is not required on the Pacific coast where fishing conditions are different from those in the Atlantic region.

The collection and checking of statistics of fisheries operations in those parts of the Dominion where the fisheries are administered by the federal authorities continued, of course, as one of the major branches of fisheries intelligence work during the year. Statistics are collected both monthly and annually by the department's Fisheries Inspectors in the several districts, thus obviating the need for special officers for this work, and are checked in the Fisheries Intelligence and Publicity Branch at Ottawa.

SEALING RECEIPTS

Revenue obtained during the fiscal year from the sale of Pribilof Island seal skins delivered to Canada by the United States under the terms of the Pelagic Sealing Treaty totalled \$103,494.19. This amount was less by slightly more than \$10,000 than the sealing revenue of the fiscal year 1935-36, when the number of Pribilof skins marketed was larger and the receipts also included a Japanese payment totalling \$1,029.87. Under the sealing treaty Canada is entitled to 15 per cent in number and value of the annual take of skins on the Pribilof rookeries where seal hunting is under the control of the United States and to 10 per cent in number and value of the take of skins on Japanese rookeries. As it happened, no Japanese payments were received during the past fiscal year.

The marketing of skins received from the United States Government was again carried on at London, England by Messrs. C. M. Lampson and Company, Limited, leading London fur dealers who acted as agents for the Dominion. All the skins sold were in the dressed and dyed condition, having been finished by the Rice-Martin process. The high level of prices which had been in evidence at the close of the preceding year continued during 1936-37 and the average net price per skin actually showed an increase, but, as indicated, the number of skins disposed of decreased somewhat and hence the reduction in the aggregate London return. Most of the skins marketed, 5,887 in all, were sold at the Spring, Autumn and Winter fur auctions in London, but some were sold by private treaty. At the spring auction 1,872 pelts found buyers and brought an average net return of \$19.28. At the Autumn sale 1,876 skins brought an average net return of \$18.46 and at the Winter sale, when 1,842 were sold, there was an average net return of \$19. The prices obtained for skins sold by private treaty were comparable to those paid at the auctions.

Skins received from the United States Government during the year numbered 7,867. Since the fur seal herds have been becoming larger under the protection of the treaty and Canada's annual share of the Pribilof take has been steadily increasing in recent years, it had been expected that the number of skins to be delivered to the Dominion during the past year would be larger than in 1935-36, when 8,594 were received. However, the number of seals taken at the Pribilofs in 1936 was smaller than the kill of the year before and there was therefore a decrease in the number of skins to which the Dominion was entitled. The decrease in seals captured is explained by the United States Bureau of Fisheries as having been due to unfavourable weather conditions which hindered the animals from coming ashore on the rookeries.

PAYMENTS OF FISHING BOUNTIES

Fishing bounties paid during the year under authority of "An Act to Encourage the Development of Sea Fisheries and Building of Fishing Vessels" totalled \$159,977.75. The bounties were paid to the owners of 529 fishing vessels and members of the vessels' crews numbering 3,121 and to 11,764 owners of fishing boats and to 20,454 boat fishermen. Out of the total amount paid, \$77,349.10 went to boat and vessel owners and fishermen in Nova Scotia, \$48,625.45 to men in Quebec, \$20,508.25 were paid in New Brunswick and \$13,494.95 in Prince Edward Island.

The basis of distribution for the 1936 season was as follows: (a) To owners of vessels entitled to receive bounty \$1.00 per registered ton, payment to the owner of any one vessel not to exceed \$80.00; (b) To eligible vessel fishermen \$6.60 each; (c) To owners of boats measuring not less than 12 foot keel \$1.00 per boat; (d) To boat fishermen entitled to receive bounty \$5.70 each.

The following table gives the details of distribution:—

1936-37

Province and County	Boats	Men	Amount	Vessels	Tons	Average Tonnage	Men	Amount	Total Amount
<i>Nova Scotia—</i>			\$ cts.					\$ cts.	\$ cts.
Annapolis.....	147	230	1,458 00						1,458 00
Antigonish.....	211	323	2,052 10						2,052 10
Cape Breton.....	544	995	6,215 50	25	367	14	107	1,073 20	7,288 70
Cumberland.....	2	2	13 40						13 40
Digby.....	369	654	4,096 80	3	39	13	10	105 00	4,201 80
Guysboro.....	584	940	5,942 00	27	337	12	111	1,069 60	7,011 60
Halifax.....	903	1,229	7,892 70	41	498	12	157	1,534 20	9,426 90
Inverness.....	251	541	3,334 70	5	70	14	23	221 80	3,556 50
Kings.....	81	111	713 70						713 70
Lunenburg.....	628	809	5,239 30	84	3,883	46	1,113	11,228 80	16,468 10
Pictou.....	26	43	271 10						271 10
Queens.....	196	340	2,134 00	17	211	12	68	659 80	2,793 80
Richmond.....	323	535	3,372 50	20	259	13	63	674 80	4,047 30
Shelburne.....	785	1,296	8,172 20	31	895	29	302	2,888 20	11,060 40
Victoria.....	326	483	3,079 10	10	145	14	43	428 80	3,507 90
Yarmouth.....	165	374	2,296 80	12	389	32	120	1,181 00	3,477 80
Totals.....	5,541	8,905	56,283 90	275	7,093	26	2,117	21,065 20	77,349 10
<i>New Brunswick—</i>									
Charlotte.....	175	314	1,964 80	1	11	11	4	37 40	2,002 20
Gloucester.....	607	1,152	7,159 25	182	3,146	17	744	8,056 40	15,215 65
Kent.....	227	404	2,529 80	10	105	10	27	283 20	2,813 00
Northumberland.....	15	30	185 00	6	67	11	11	139 60	325 60
Restigouche.....	5	7	44 90						44 90
Saint John.....	10	17	106 90						106 90
Totals.....	1,039	1,924	11,991 65	199	3,329	16	783	8,516 60	20,508 25
<i>Prince Edward Island—</i>									
Kings.....	171	245	1,567 50						1,567 50
Prince.....	703	1,321	8,320 20	1	20	20	3	39 80	8,360 00
Queens.....	341	550	3,465 45	3	35	11	10	101 00	3,567 45
Totals.....	1,215	2,116	13,354 15	4	55	14	13	140 80	13,494 95
<i>Quebec—</i>									
Bonaventure.....	523	1,022	6,348 40	10	100	10	36	337 60	6,686 00
Gaspé.....	2,749	5,269	32,782 30	41	458	11	169	1,573 40	34,355 70
Matane.....	162	290	1,802 90						1,802 90
Saguenay.....	535	928	5,780 85						5,780 85
Totals.....	3,969	7,509	46,714 45	51	558	10	205	1,911 00	48,625 45
Grand totals.....	11,764	20,454	128,344 15	529	11,035	20	3,121	31,633 60	159,977 75

NOTE.—A number of "Late" claims amounting in all to \$2,929.35, are included in the above statement and are for the season of 1935. As the basis of distribution for 1935 differed from that of 1936 the figures shown in the "Amount" columns do not balance in all cases with the number of claims paid.

INTERNATIONAL FISHERIES COMMISSION, 1936-37

During the fiscal year a new halibut treaty was signed by Canada and the United States to supplant the Convention of 1930. It adds to the treaty of 1930 by giving the International Fisheries Commission control over halibut caught incidental to fishing for other species in areas closed to halibut fishing. The commission is also empowered to prohibit departure of vessels for an area when the number of vessels already departed is sufficient to catch the limit set under the treaty. This will allow vessels to secure a full load on their last trip and will remove the temptation to break the law of fishing after closure.

Canadian representation on the commission was changed during the year. Dr. John Pease Babcock, Chairman, and Dr. William A. Found, Deputy Minister of Fisheries for Canada, who had served as commissioners from the formation of the Commission, resigned. The vacancies were filled by the

appointment of Messrs. George J. Alexander, Assistant to the Commissioner of Fisheries for British Columbia, and A. J. Whitmore, Head of the Western Division of the Department of Fisheries of Canada. Mr. Alexander was elected chairman to succeed Dr. Babcock.

The long and distinguished career of Dr. Babcock ended with his death at Victoria, B.C., on October 12, 1936, shortly after he had retired from the commission. Dr. Babcock was a leading advocate of the rational use of fishery resources and of scientific research as a means to that end, principles which he consistently applied as Assistant to the Commissioner of Fisheries for British Columbia from 1901 to 1934 and as Chairman of the International Fisheries Commission from 1924 to 1936.

During the year the commission continued to perform its duties—the investigation of the life history of the halibut and the investigation and regulation of the fishery—as provided in the treaty of May, 1930. The investigations added knowledge, essential to effective regulation, regarding the life history of the species and the changes occurring in the stocks of fish as a result of regulation.

The close contact with the halibut industry, which has contributed largely to the success of the commission, was maintained as in previous years. On November 21, meetings with the vessel owners and fishermen and a public hearing were held in Prince Rupert. On December 22, a meeting with the Conference Board, composed of representatives of the fishing fleets at the different ports, was held in Seattle. At the meetings and hearing, the purpose and progress of the commission's investigations and the effects of regulation were explained and the problems of the fleets were discussed.

CHANGES IN REGULATIONS

Fishing regulations for 1936 were altered in several respects from those of the preceding year. The opening of the fishing season was set for March 16, two weeks later than in 1935. The boundaries of Areas 1 and 4 were changed so that Area 1 included all waters south of Willipa harbour and Area 4, the waters of the Aleutian islands and Bering sea. Dory fishing in Areas 1 and 2 was prohibited. The setting of a separate date of closure for the spawning grounds between Ocean cape and cape St. Elias was discontinued and December 1 was set as the date of closure of all grounds not previously closed.

The boundaries of Areas 2 and 3, their catch limits of 21,700,000 and 24,300,000 pounds respectively, the complete closure of the Massett and Timbered Islet nurseries, the closure of Area 1 at the same time as Area 2 and the closure of Area 4 with whichever of Areas 2 and 3 closed later, were continued as in 1935.

Although the fishing season was opened two weeks later and the voluntary catch curtailment program was continued, the catch limits of both Areas 2 and 3 were attained earlier than in 1935. This was due to the strike which in 1935 delayed the beginning of fishing until about April 1, to a greater intensity of fishing in both areas, and to a considerable increase in abundance in Area 3 in 1936. Areas 1 and 2 were closed at midnight of August 10, with catches of approximately 699,000 and 23,336,000 pounds, respectively. Area 3 was closed at midnight on November 3, with a catch of approximately 25,704,000 pounds. Area 4 closed at the same time, but no fish was landed from that area. The Area 3 catch exceeded the limit for the first time since the inauguration of regulation by the limitation of the catch.

The scientific investigations of the commission were continued as required by the treaty. They include the current collection and analysis of statistical and biological data and form a system of observation of the changes occurring

as a result of regulation and a necessary basis for the continued intelligent control of the fishery. The collection of biological data made necessary the operation of a vessel.

INCREASED ABUNDANCE

The abundance of fish, as indicated by the catch in pounds per unit of gear fished, continued to increase in Area 3, which includes the grounds north and west of cape Spencer, Alaska. The average catch per unit of gear rose to 97 pounds in 1936, an increase of 10.2 per cent from the previous year and an increase of 51 per cent from 1930, the last year of unrestricted fishing.

Area 2, which includes the grounds off the coast of British Columbia, maintained the greater abundance of the last two years as nearly as could be expected. It failed, however, to show a further increase in the catch per unit of effort for the first time since 1930. The direct effect of the present degree of restriction has been most marked during the first years it was imposed, slackening off as the rise approached its maximum, and the effect upon the production of young will be gradual. The maximum has apparently not yet been reached, but the annual increase is now at times temporarily overshadowed by the variations in the catch due to changes in natural conditions. Examination of the seasonal trend of abundance offers assurance that the failure of the catch per unit of effort to show any increase was due to abnormalities in the distribution of the fish and not to failure of the stock itself. Better catches during the first trips of the 1937 season support this view.

Market measurements, the measurement of samples of fish as landed by commercial fishing boats, was continued. More than 79,000 halibut were measured and comparison with those taken in previous years will throw further light on the changes occurring in the different stocks of fish.

Knowledge of the age, rate of growth and age-composition of the halibut was increased by the working up of previously collected material from a bank about which such information was lacking. New material for the determination of the changes in age composition as a result of regulation was collected in conjunction with the taking of market measurements.

The work of following the effects of regulation upon the production of spawn in Area 2 was continued. The materials collected in the net hauls taken in the vicinity of cape St. James during the winter of 1935-36 were sorted at the laboratory and new material was collected in the field. Halibut eggs are still scarce, though their abundance in that region during the winter of 1935-36 was found to be about twice as great as during the winter of 1934-35.

SPAWN MORE PLentiful

The halibut schooner *Eagle* was chartered and operated in the neighbourhood of cape St. James from early December to early February. During that time, 187 standard net hauls were taken at 80 stations. The sorting of the material taken in these hauls is not yet complete but partial results indicate a further increase of halibut spawn. Twenty-three quantitative net hauls were also made at a number of stations to try out a new device for opening and closing plankton nets at any desired depth. This mechanism functioned successfully. The results of these hauls will show the exact levels at which the eggs float and what layers of water carry them. Thirteen hydrographic stations, taken in conjunction with these quantitative hauls, will throw additional light upon the character of the water strata in which the eggs are found. The new mechanism for opening and closing plankton nets will make possible a greater accuracy in the determination of the number of eggs in the water.

A small tagging experiment to measure the present rate of removal of halibut was instituted in May at Goose Island bank when 464 halibut were marked

from the privately operated boat *Hoover*. In addition to being tagged with the usual monel metal tag, about fifty per cent were tattooed on the white side to check the efficiency of tattoo marks which an experiment in 1935 indicated to be more conspicuous than the metal tags.

A series of non-technical publications, the circulars, were begun by the commission to inform the fishermen, vessel owners and dealers of the results of the commission's investigation and of other matters relating to the halibut and to the regulation of the fishery. Four circulars were issued dealing with the following subjects: *The Halibut Commission, its Legal Powers and Function*, by Edward W. Allen; *Science and the Halibut*, by G. J. Alexander; *The Canadian Halibut Fleet*, by A. J. Whitmore, and *The American Halibut Fleet*, by Frank T. Bell. The contents of Circular No. 1 are clearly indicated by its title. Circular No. 2 summarizes the scientific basis on which the regulation of the halibut fishery rests. Circulars 3 and 4 give the results of studies of the economic effects of the regulation upon the halibut fleets of Canada and the United States, respectively.

Circular No. 3, *The Canadian Halibut Fleet*, shows that as a direct result of regulation the halibut live longer and reach a larger size and more valuable grade before capture. The increase in abundance of fish and an increase in the number of boats fishing have reduced the length of the fishing season. In spite of this reduction, the total halibut catch per boat in the Canadian fleet has increased. The Canadian share of the total landings from both Areas 2 and 3 has increased. Moreover, the shorter season has enabled the vessels to engage in other activities and thereby to supplement their earnings from the halibut fishery.

NORTH AMERICAN COUNCIL ON FISHERY INVESTIGATIONS

The council held its 23rd meeting at New York in the American Museum of Natural History from September 23 to 25, 1936. The French members were unable to cross the Atlantic for the meeting, and the approaching departure of Dr. Harold Thompson from Newfoundland to assume the post of Director of Fishery Investigations in Australia prevented his attendance. Both the United States and Canada, however, were well represented. Dr. H. B. Bigelow, of the Woods Hole Oceanographic Institution, presided as chairman of the council, and the other members present were Mr. F. T. Bell, United States Commissioner of Fisheries, Mr. Elmer Higgins, of the United States Bureau of Fisheries, Dr. W. A. Found, Deputy Minister of Fisheries for Canada, and Dr. J. P. McMurrich and Dr. A. G. Huntsman, of the Biological Board of Canada. Dr. A. H. Leim, Director, and Dr. A. W. H. Needler, Mr. H. B. Hachey and Mr. R. A. McKenzie, of the Atlantic Biological Station, formed the Canadian portion of the group of advisers.

An unusual feature was the presence of Dr. Johan Hjort, of Norway, who has for many years taken an outstanding part in the work of the International Council for the Exploration of the Sea, the organization through which the countries of northern Europe co-ordinate their activities and co-operate in fishery investigations as do the countries on the west side of the North Atlantic ocean through the North American Council. Dr. Hjort stressed the importance of common study of the fluctuations in the abundance of year-classes (yearly additions of young to the population) of important commercial fishes, such as the cod and the herring, on both sides of the Atlantic. The two councils have undertaken to co-operate in this work and have appointed reporters for cod, herring, haddock, salmon, etc., through whom the results obtained are being brought together and compared.

Perhaps the most important subject before the meeting was the proposal for an agreement between the governments of the United States and Canada to

regulate the fishery for haddock in the international waters with which both countries are concerned. The council had recommended the adoption of a larger mesh of net for all trawls used in the capture of haddock, in order to stop the waste involved in the taking of large quantities of under-sized fish. Decreasing catches had made quite evident the need for adoption of measures of conservation. When the whole situation was reviewed, it became apparent that changes in fishing gear for haddock would affect other fisheries as well. It was decided to consult the fishing industry further before reaching a definite conclusion as to the course which, in the council's view, would be best to be followed.

Newfoundland and Canadian investigations of the cod continue to show how important the temperature of the sea is in determining the behaviour of this fish. The largest catches are made at temperatures from 32° to 40° F., both lower and higher temperatures tending to be unfavourable. The most favourable temperatures seem to be somewhat higher in summer than in spring. Yearly fluctuations in the amount of Arctic water brought south by the Labrador current change the localities on the banks where the cod can be taken in quantity, and knowledge of the variations in the current have made it possible to predict the changes in the cod catch. That most of the fish do not move very far (less than 100 miles) is shown not only by the results from tagging experiments, but also by the fact that in each district the cod tend to be more or less peculiar in structure in correspondence with the local physical conditions of the water. Occasional fish do, however, travel quite far, as from Halifax to Newfoundland. Temperatures above 50° F. cause cod in the Halifax district to eat less, which affects the readiness with which they may be caught with bait. On the whole, however, the fishery in this district is best in warm years and poorest in cold years.

Your obedient servant,

WM. A. FOUND,
Deputy Minister of Fisheries.

APPENDIX No. 1

ANNUAL REPORTS FOR THE YEAR 1936 BY THE CHIEF SUPERVISORS OF FISHERIES

REPORT OF MAJOR D. H. SUTHERLAND, CHIEF SUPERVISOR, EASTERN DIVISION

Improved conditions in the fisheries which, after three years of declining production and values, were first noticeable in 1934 and have continued since then, were more definitely apparent in 1936 when there was a sharp rise in the Eastern Division, both in respect to the quantities of fish landed and their values. The total marketed value of \$14,674,360 for this division brings the industry back to a position of more favourable comparison with 1930 and the more prosperous years before that time. The total production was approximately 472,000,000 pounds, the greatest since 1929, and an increase of 55,765,000 pounds over the preceding year's catch. Increase in the returns to the fishermen in landed value was over \$1,000,000. Increased total production and values were general in all the seven districts of the division with the exception of the Magdalen Islands where slight decreases occurred, due to a failure in the catch of mackerel. Nova Scotia contributed over one-half of the total catch increase of the division, New Brunswick about one-third and Prince Edward Island the remainder.

The total marketed values and the approximate quantities of all varieties of fish and shellfish landed throughout this division during the past six years have been as follows:—

	Production	Marketed Value
	lbs.	\$
1936.....	472,320,800	14,764,797
1935.....	419,000,000	13,081,989
1934.....	422,000,000	12,786,565
1933.....	390,000,000	10,205,397
1932.....	346,000,000	10,914,282
1931.....	374,000,000	13,680,034

In 1936 lobsters, cod, sardines and haddock were again the most valuable varieties of fish taken, and of these, while the catch declined 3,667,800 pounds, the lobster maintained its position as the most valuable fishery in the Eastern Division and the second most valuable for all of Canada.

The cod fishery of Nova Scotia and the sardine fishery of New Brunswick make up over one half the total increase in production for the division. The herring, mackerel, hake and haddock fisheries also yielded satisfactory increases while the production of lobsters, swordfish, oysters and clams was somewhat less than in the previous year.

THE LOBSTER FISHERY

For the fourth successive year the catch of lobsters has decreased notwithstanding very intensive fishing. Figures as to fishermen licensed and the catch, year by year, since 1932 are as follows:—

	Fishermen Licensed	Pounds
1936.....	18,551	28,057,200
1935.....	18,153	31,725,000
1934.....	17,975	35,658,800
1933.....	17,367	37,012,100
1932.....	15,706	47,852,100

The catch decline, while general in 1936, is more apparent in the Gulf area where there was the most productive fishery. While the open season there is only of two months' duration there are no size limit restrictions and canneries are operated on an extensive scale.

The catch for the division was 28,057,200 pounds valued to the fishermen at \$3,426,620 as compared with 31,725,000 pounds with a landed value of \$3,148,310 in 1935. This catch represents a decline of 58.7 per cent since 1932.

In Nova Scotia the catch decreased by over 3,100,000 pounds, the drop being greatest in the eastern mainland section, where about 2,000,000 pounds less were taken than in 1935. Cape Breton Island produced about the same quantity as in the previous year while in southwestern Nova Scotia the catch decreased by about 1,000,000 pounds, the decrease being equivalent to the quantity caught during the extension of ten days made to the 1935 season.

On the south coast of New Brunswick the catch fell off by 180,000 pounds but it should be remembered that the winter season closed on February 28 while in 1935 fishing was permitted until May 31. On the east coast of the province there was an increase of 346,000 pounds; there was somewhat better fishing in Gloucester county and heavier landings were made in the late fishing area of Kent and Westmorland counties.

In Prince Edward Island and the Magdalen Islands the catch declined 660,100 pounds.

The pack of canned lobsters was 87,390 cases of 48 pounds each compared with a pack of 98,964 cases in 1935, 114,679 cases in 1934, 120,771 cases in 1933 and 164,981 cases in 1932.

Notwithstanding the short catch and pack, however, the returns to the fishermen were greater in most districts, owing to a higher price range for green lobsters.

(A table showing catch, pack, shell and lobster meat shipments, with their respective values for the division for the past four years, will be found on page 9 of this volume.)

THE COD FISHERY

The production of codfish in the division was 133,158,400 pounds, the greatest since 1929. The Nova Scotia catch accounts for almost the entire increase of approximately 15,493,700 pounds over the 1935 total. In New Brunswick the catch fell off by about 1,837,100 pounds, or a quantity about equal to the increased catches of Prince Edward Island and the Magdalen Islands.

The landed value of codfish was \$1,617,198 compared with \$1,334,215 in 1935, and the marketed value \$2,692,605 as compared with \$2,162,146. Heavy landings in all districts of Nova Scotia for the fresh and frozen trade were noted while there was a further decline in the catch made by the Lunenburg and Caraquet salt fishing fleets.

THE SARDINE FISHERY

The catch of sardines, which was all taken off the coast of Saint John and Charlotte counties, was greater by some 11,773,000 pounds than the 1935 landings; in fact it was greater than the catch of any year since 1929. A total of 49,273,600 pounds was taken with landed value of \$337,168 and marketed value of \$1,597,192 as compared with 37,499,800 pounds with landed value of \$276,175 and marketed value of \$1,335,279 in 1935. The sardine canners put up a record breaking pack of 393,854 cases. The next largest pack was in 1929 when 329,204 cases were canned. There was a considerable decline in the 1932 output but since then there has been an increase each year as will be noted by the following table:—

	Cases
1936..	393,854
1935..	338,436
1934..	288,091
1933..	180,597
1932..	113,197

THE HADDOCK FISHERY

There was a sharp increase, over 3,500,000 pounds, in the catch of haddock, a total of 40,041,400 pounds being landed in the division, or the largest quantity since 1930. This is due chiefly to heavier landings on Cape Breton Island at North Sydney and particularly of spring and fall haddock in the Ingonish area. The haddock fishery is almost entirely confined to Nova Scotia. The early summer catch of haddock of Charlotte county, New Brunswick, while small in comparison with the Nova Scotia production, was greater in 1936 by over 250,000 pounds than the catch of the previous year. The winter run of haddock, however, in this area was practically a failure. The landed value of the catch for the division was \$663,641, compared with \$570,083, while the marketed value was \$1,287,308, compared with \$1,124,420 for 1935.

THE HERRING FISHERY

Herring catch totalled 94,056,800 pounds with landed value of \$367,974 and marketed value of \$1,009,337. In 1935 the divisional totals were: Catch, 85,250,900 pounds, landed value \$392,798, and marketed value \$960,994. Almost half of the increase of more than 4,118,200 pounds occurred in New Brunswick. In Prince Edward Island there was a heavy increase of 2,497,300 pounds and an increase in the Magdalen Islands of 1,410,900 pounds while in Nova Scotia the catch rose 769,500 pounds.

The total marketed value was \$48,343 greater than in 1935, increases being shown in Nova Scotia, Prince Edward Island and the Magdalen Islands.

THE SMELT FISHERY

The largest producing area for smelts is along the east coast of New Brunswick and in this section there was an increase in the catch of over 1,000,000 pounds. Increased landings were made in all counties except Restigouche but there were decreases in portions of Gloucester and Northumberland counties and in order to enable the fishermen to make up for the loss a 10-day extension was granted. Smelts taken in January and February were far superior to those taken in December but the prices paid were the lowest for years. In Nova Scotia and in Prince Edward Island there were slight increases in catch, as well as in landed and marketed value, but in the Magdalen Islands the total catch was little more than half as large as that of 1935.

The landed value for the division was \$47,888 greater, and the marketed value \$60,563 greater, than for the previous year.

THE MACKEREL FISHERY

Nova Scotia produces the greater part of the mackerel catch, which increased in 1936 by 6,702,600 pounds. Cape Breton accounts for almost half of the increase; this condition was due to an unusually large spring and summer run on the island's coast from L'Ardoise to Ingonish. On the eastern section the catch was the largest since 1933 when a record was made of 9,542,300 pounds. The catch sold readily, considerable quantities being marketed fresh at fair prices. In the western part of the province there was an increase of 2,388,100 pounds, practically all the increase taking place in Lunenburg county. The Magdalen Islands, although the second largest producing area in the division, show a heavy decline of more than 1,959,300 pounds in 1936. Slight increases are shown in the catches of Prince Edward Island and New Brunswick. Total landed value increased \$82,626 and the marketed value \$153,166 as compared with 1935 results.

THE SALMON FISHERY

The catch of salmon was 2,331,900 pounds with landed value \$295,836 and marketed value \$353,960, as compared with 2,265,500 pounds, landed value of \$261,473 and marketed value of \$333,748 in 1935. There was a substantial increase on the east coast of New Brunswick but a slight decrease in the Bay of Fundy catch. In Nova Scotia there were increases on both sections of the mainland but a decline on Cape Breton island. The increase in catch for the division was 66,400 pounds, with an increase in marketed value of \$20,212.

THE HALIBUT FISHERY

Practically the entire divisional catch of halibut is made in Nova Scotia waters, and out of the total landings for the division of 3,119,600 pounds, 3,104,400 pounds were landed in that province, an increase of over 200,000 pounds over the landings for 1935. The increase occurred along the eastern mainland and in Cape Breton. Landings in the southwestern part of the province decreased. The marketed value for the division was \$50,948 greater than in 1935.

THE SCALLOP FISHERY

The catch of scallops for the division was 170,610 gallons (shelled) with landed value of \$312,761 and marketed value of \$334,016, as against 133,105 gallons (shelled), landed value of \$206,724, and marketed value of \$207,341 in 1935. Of the total catch for the division 163,305 gallons (shelled) were taken in Nova Scotia and had a marketed value of \$322,537. This is an increase over the previous year of 36,982 gallons and \$125,729 in marketed value. This fishery has shown rapid development in Nova Scotia since 1920 as will be noted from the following table which gives the catch and marketed value at intervals of five years since that date:—

1920..	8,372	gals.	(shelled)	..	..	..	\$	28,848
1925..	24,808	"	"	..	..	..	..	76,025
1930..	32,976	"	"	..	..	..	..	81,619
1935..	126,371	"	"	..	..	..	..	196,808
1936..	163,305	"	"	..	..	..	..	322,537

New boats and improved gear have been added to the western Nova Scotia fleet and the number of licenses issued has increased from 105 in 1931 to 113 in 1935 and 145 in 1936. The new bed which was located by the departmental ship *Arleux* in 1935 produced a large part of the scallops landed particularly by the larger boats that were built and fitted for offshore work.

The New Brunswick catch, 7,305 gallons, (shelled) was slightly greater than the catch in 1935 when 6,734 gallons (shelled) were taken.

THE HAKE AND CUSK FISHERY

An increase of 3,782,600 pounds is shown in landings of hake and cusk. The landed value increased by \$13,571 and the marketed value by \$94,310 over 1935 figures. Nova Scotia accounts for 2,582,000 pounds of the increase, about two-thirds of this gain being due to heavier landings in the western part of the province. In Prince Edward Island the catch increased 685,800 pounds but on account of the low price received the fishermen did not engage in this fishery to such an extent as might otherwise have been the case. New Brunswick landings were 14,800 pounds greater than in the preceding year, as a result of an increase in landings on the east coast of the province. There was a decline in landings on the east coast of New Brunswick.

THE SWORDFISH FISHERY

The total catch of swordfish, all made by Nova Scotia fishermen, was 1,785,000 pounds with landed value of \$150,274 and marketed value of \$230,798, compared with 2,233,900 pounds, landed value of \$148,401, and marketed value of \$264,097 in 1935. It should be noted, however, that while there was a decrease in the 1936 catch as compared with 1935 landings, 1935 was a peak year and the catch for 1936 was greater than that of any year previous to 1934. Most of the decrease is shown in the Cape Breton catch, 698,500 pounds less being taken in that part of the province. Landings on the eastern mainland increased by over 259,000 pounds when there was a notable rise in the catch in Guysboro county. This fishery has shown marked improvement since 1920 as will be noted in the following table which gives the catch and marketed value at 5-year intervals since 1920:—

	Pounds	Marketed Value
		\$
1920.....	335,100	51,104
1925.....	455,100	78,209
1930.....	1,193,300	214,806
1935.....	2,233,900	264,097

THE OYSTER FISHERY

Oyster production for the year was 4,154,000 pounds, with landed value of \$93,747 and marketed value of \$130,235, as compared with 4,752,000 pounds, landed value of \$101,864 and marketed value of \$136,517 in 1935. Prince Edward Island was the heaviest producer but shows a decrease of 654,400 pounds. There has been a steady increase during the past few years in the production in the leased areas of Malpeque bay and tributaries and in the Bedeque Bay area the catch was almost double that of 1935. Fishermen in this latter area report a large quantity of healthy spat over the entire bay and prospects are bright for future increased production. Nova Scotia catch fell off 91,200 pounds, but the 1935 catch was 1,075,000 pounds, the highest on record in this province. The New Brunswick catch in 1936 was slightly more than in the year before and about the same as in 1934. A new bed was located at Oak point, which produced oysters of good quality.

THE CLAM FISHERY

Production of clams in the division totalled 8,895,000 pounds and had a landed value of \$51,807 and marketed value of \$101,613. In 1935 the catch was 9,970,200 pounds, with landed value of \$55,737 and marketed value of \$109,015. There was a heavy decrease in the landings in both the Magdalen Islands and Nova Scotia but slight increases in New Brunswick and Prince Edward Island.

NOVA SCOTIA

The total Nova Scotia production of fish in 1936 was the highest since 1929, when the quantity landed was 265,041,900 pounds, and was 29,776,000 pounds greater than the production for 1935. Dollar returns were also much greater than in 1935, showing an increase of \$729,436 in landed value and approximately \$1,052,369 in marketed value. The provincial fishery of most importance is the lobster, and while the catch declined by 3,174,500 pounds, the returns to the fishermen were greater by about \$79,396; marketed value, however, fell off by \$162,598. The heaviest decrease occurred along the eastern mainland, where the catch fell off 2,053,500 pounds and there was a decrease of 1,037,500 pounds in the western part of the province. In Cape Breton the catch was 83,500 pounds less than in 1935. Annual catches for the province for the past six years have been as follows:—

	Pounds
1936..	14,509,100
1935..	17,683,600
1934..	18,459,000
1933..	17,685,800
1932..	23,773,000
1931..	22,364,900

An outstanding feature of the year was the increase of over 13,000,000 pounds in the total Cape Breton landings of fish and shellfish and a similar increase in the western portion of the province. Notable increases were: cod, 15,493,700 pounds; mackerel, 7,979,600 pounds; hake and cusk, 2,582,000 pounds; pollock, 2,522,000 pounds; haddock 3,550,600 pounds. There were smaller increases in the case of herring, halibut, smelts and flounders. It was a record year for the scallop fishermen, as will be seen from the increase of 36,934 gallons (shelled) in the production.

The salmon catch decreased by 1,100 pounds. Reduction in Cape Breton landings explains the decline, as there were increases along both sections of the mainland.

The table given below shows the total catches and values for 1936 and 1935, respectively, and gives similar information covering the chief varieties taken:—

1936

Total quantity of all fish landed, lbs.....	265,092,200
Landed value.....	\$ 5,491,552
Marketed value.....	\$ 8,905,268

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	14,509,100	1,993,170	2,570,274
Cod.....	107,932,800	1,398,509	2,341,724
Haddock.....	39,184,800	642,838	1,263,161
Herring.....	22,670,400	141,900	366,815
Mackerel.....	19,061,600	227,931	384,499
Halibut.....	3,104,400	268,693	388,461
Scallops (shelled)..... gals.	163,305	301,282	322,537
Swordfish.....	1,785,300	150,274	230,798
Hake and cusk.....	14,105,300	62,284	243,374
Salmon.....	601,900	78,487	97,412
Pollock.....	7,521,000	37,496	79,511
Smelts.....	768,000	47,341	65,973
Oysters.....	983,800	23,955	28,660
Flounders.....	661,600	8,284	29,370

1935

Total quantity of all fish landed, lbs.....	235,357,700
Landed value.....\$	4,762,116
Marketed value.....\$	7,852,899

	Lbs.	Landed Value \$	Marketed Value \$
Lobsters.....	17,683,800	1,913,774	2,732,872
Cod.....	92,439,100	1,103,381	1,809,573
Haddock.....	35,634,200	553,051	1,104,618
Herring.....	21,900,900	147,334	351,998
Mackerel.....	11,082,000	141,324	213,718
Halibut.....	2,903,500	232,364	338,017
Scallops (shelled)..... gals.	126,371	196,191	196,808
Swordfish.....	2,233,900	148,401	264,097
Hake and cusk.....	11,523,300	51,267	162,585
Salmon.....	603,000	74,271	89,249
Pollock.....	4,999,000	29,365	53,732
Smelts.....	618,000	37,722	58,334
Oysters.....	1,075,000	21,279	28,977
Flounders.....	529,700	5,843	22,712

ANGLING IN NOVA SCOTIA

Taken as a whole, 1936 can be considered as having been a good year for salmon angling in Nova Scotia. Save in Cape Breton island, the number of salmon and grilse landed by rod and line shows a decided increase. Weather conditions could not be considered ideal from some standpoints but a greater or more widely distributed rainfall gave better water conditions in rivers and streams than in the previous year, with the result that salmon and grilse were more ready to take the fly.

Reports received covering trout fishing indicate that this sport was not up to the average, although some good individual catches were made. During the early part of the season, when a good deal of trout fishing is ordinarily done, water conditions were not favourable.

Landlocked salmon and grey trout were responsible for some good sport in waters which they frequent and some large specimens were landed.

New ventures in angling which should mean much for the province brought the development of sea angling for tuna and swordfish. In the western mainland tuna angling was placed on a commercial scale while in Cape Breton similar steps were taken in connection with swordfish angling.

Angling in Cape Breton.—Salmon angling in this part of the province was not as good as during 1935, and was not up to average. On the Margaree and Little rivers the water level was high until nearly the last of May but after the salmon angling season opened on June 1 the water fell off rapidly and by the 20th was at a low level. During the summer frequent light rains kept these rivers from getting very low, but really favourable water conditions did not obtain until the latter part of September. On the Margaree 286 salmon were landed, as compared with 527 during 1935, 144 in 1934 and 470 during 1933. None were landed in June and few until after July 15. Fishing was good from the middle of September until the end of the season. On the Little river 29 salmon were taken as compared with 53 in 1935, 3 in 1934 and 116 in 1933. Water conditions on this river were good when salmon struck that part of the coast in June, but only a few fish entered the river. Water conditions were favourable for fishing on North river, St. Anns, but salmon did not ascend the river in large numbers, 126 being taken as compared with 248 in 1935. On Baddeck river 6 salmon were taken as against none in 1935. Grand river also showed an increase, 37 salmon being landed as compared with 13 in 1935.

Trout fishing was generally better than during 1935. The catch on the Margaree was 1,885 as against 1,227 in the preceding year. The fish showed larger size and several weighing from four to five pounds were landed. June and July produced the best catch, with a falling off in August.

From Little river, Cheticamp, good catches were reported from the opening of the season to the end of April, with June also providing good sport. The season's catch is reported at 351, as compared with 151 in 1935.

Trout were more plentiful in the streams of Pleasant bay, 1,404 being taken compared with 852 in 1935. They were also fairly plentiful early in the season, when water conditions were favourable in river Denys, Indian river, Mabou river and Judique river. Excellent catches were landed from lake Ainslie in May when approximately 1,200 fish were taken. During June a large run of trout appeared in Trout river, lake Ainslie. Richmond county rivers and streams produced a larger quota of trout than in previous years.

In the two principal trout waters of Cape Breton county, Catalone lake and Mira river, there was good angling, particularly during May. The largest trout reported taken in Cape Breton was from Catalone lake and weighed six pounds, five ounces.

During 1936, 2,610 pounds of trout were reported taken, as compared with 2,209 pounds in 1935, from the waters of Washabuck, Middle, Baddeck, Barrasois and North rivers and Indian brook. There was good fishing during the latter part of April in Middle and Baddeck rivers and satisfactory catches were taken during the last two weeks of July in all these waters. Clyburn's brook, Ingonish, and North Aspy river, where satisfactory water levels were maintained during the early summer, showed marked catch improvement.

Angling, Eastern Mainland.—Angling was generally better than during 1935. Water conditions throughout the season were favourable, especially during July, and salmon were numerous. On the St. Mary's river the best salmon angling was found and 930 fish were taken. Tangier river was second with a catch of 282. Good catches were also made in Lawrencetown waters with 168 fish being landed. Ingram river produced 175 salmon, Musquodoboit river 74, Ship Harbour river 29 and Quoddy river 19. The table below shows comparative figures of salmon taken by angling on the principal rivers of Guysboro county during the past three years:—

	1936	1935	1934
St. Mary's river.....	930	241	64
Liscomb river.....	105	51	6
Ecum Secum river.....	82	71	51
Gaspereau brook.....	19	5	8

The large catch on the St. Mary's river is generally attributed, although the point is not definitely established, to the heavy stocking from the Fraser Mill hatchery.

Spawning conditions for salmon, except on the Tangier river and East river, Sheet Harbour, were good, the water supply being sufficient to enable the fish to pass up stream at the proper time.

Trout fishing was good in the streams and lakes tributary to the Atlantic and about average, as compared with other years, in waters tributary to Northumberland strait. Stockings being made by the hatcheries seem to be definitely showing results.

Angling for rainbow trout, however, was rather disappointing, 56 fish only being reported taken as compared with 136 reported in 1935.

Angling, Western Mainland.—Salmon angling was generally good during the year. Water conditions were much more favourable than in 1935 with the result that practically all salmon waters showed many more fish.

The following statement gives comparative figures of fish reported landed in 1936 as compared with 1935:—

	1936	1935
<i>Lunenburg county—</i>		
Gold river.....	65	20
Middle river.....	68	125
East river.....	41	20
LaHave river.....	200	150
Petite riviere.....	200	110
<i>Queens county—</i>		
Medway river.....	715	474
Mersey river.....	993	662
<i>Shelburne county—</i>		
Roseway river.....	7	0
Clyde river.....	97	30
<i>Yarmouth county—</i>		
Tusket river.....	114	80
<i>Digby county—</i>		
Salmon river.....	30	28
<i>Annapolis county—</i>		
Lequille river.....	78	4
Round Hill river.....	106	20
Annapolis river.....	114	30
Nictaux river.....	58	13
<i>Kings county—</i>		
Gaspereau river.....	55	37

Trout fishing, while good, was not quite equal to that of 1935. This may be attributed not to scarcity of fish but rather to unfavourable weather conditions, which kept anglers off trout waters at times when large catches would normally be expected.

NOVA SCOTIA PATROL SERVICE

In the eastern district of the province the patrol boats employed during the year were the *Gilbert* and the *Venning*, owned by the department, and two chartered boats the *Marmat* and the *Daisy L.* In the western district patrol was carried on by the *Capelin* and *Halkett*.

The *Gilbert*, after having repairs completed at Bridgewater, sailed east on April 17 to carry on lobster protection work in lobster fishing district No. 5. She arrived at Pictou on April 26 to assist in supervising the opening of the lobster season in district No. 7. When the necessary patrol work had been completed and licences checked, she proceeded on May 18 to bay Chaleur, New Brunswick, to tow salmon pontoons for the New Mills hatchery. Upon completion of this work on July 16, she carried on a short patrol in New Brunswick district No. 2 and returned to Nova Scotia district No. 2 for duty on July 22. The *Gilbert* proceeded to Souris, Prince Edward Island, on July 30 and carried on patrol duty in the eastern section of the strait between Nova Scotia and Prince Edward Island, including patrols from Pictou and Mulgrave, until November 1. After patrol work and lobster protection work in western Nova Scotia, the *Gilbert* was laid up at Halifax on February 15. Her work was very satisfactory, 6,521 miles being covered in patrol duties.

The *Venning* patrolled on the Atlantic coast, particularly in lobster fishing districts No. 5 and No. 7, until May 23 when she was detailed to work in New Brunswick district No. 2 in the Miramichi river area. On July 5 the boat returned to Nova Scotia, patrolling from Canso to Hubbards. Returning to the strait area on August 2 she was employed there until October 23, when she went on duty in Halifax and Lunenburg counties until the end of March. During the year the *Venning* covered 9,801 miles on patrol work, and rendered very satisfactory service.

The chartered boat *Marmat* was constantly engaged from April 27 to October 13 in the strait area. This boat carried out the experimental lobster fishing with traps with raised heads and later on was used in other experimental work off Pictou. During the open season in lobster district No. 8 she was employed in marking the boundary line between the two seasons. Her services were satisfactory.

The *Daisy L.* an additional chartered boat, was engaged from August 15 to September 30 in the Cumberland and Pictou areas. The boat and crew gave satisfactory service.

The *Halkett* was laid up for repairs in February at Lunenburg and recommissioned about the middle of March. Patrol was carried on in Lunenburg, Queens and Shelburne counties. Efficient service was given in the prevention of illegal lobster fishing, etc., and assisting in towing fishing boats to safety in bad weather. Protection was also afforded the salmon fisheries in the Medway estuary. The distance patrolled by the *Halkett* during the year was 5,125 miles.

The *Capelin* patrolled in the waters of southwestern Nova Scotia from Pubnico to the head of the bay of Fundy throughout the year, principally in connection with preventing illegal lobster fishing and enforcing the size limit regulation. During the winter months she acted as a *mother* ship to the haddock and lobster fishermen in St. Mary bay and adjoining districts in the bay of Fundy. During the year 2,726 miles were patrolled, this low mileage being accounted for by the fact that the *Capelin* was laid up for a long period, while her gasoline engine was being removed and a crude oil engine installed. With the new engine the *Capelin* proved to be more effective in the service and much more economical. During the period the *Capelin* was laid up patrol boat No. 389 was employed on a charter basis in Yarmouth county.

FISHERIES PROTECTION SERVICE

In the fisheries protection service the *Arras* and *Arleux* continued to give splendid service in patrolling both inshore and offshore areas throughout the year. The *Arras* again accompanied the Lunenburg fleet to the Grand Banks. Dr. G. C. McDonald, who was on board the ship on the banks as medical officer, treated 398 cases of sickness and accident during the season.

Both ships are used where needed throughout the division but as a usual thing they operate on the Atlantic coast of Nova Scotia during the fall and winter months, protecting territorial waters and the various fisheries, principally the lobster fishery. In the spring and summer months it has been found necessary to have the *Arleux* spend a good deal of time in the Gulf of St. Lawrence in connection with lobster boundary and close season patrol. During the year the two vessels answered many calls from fishing craft in distress. They also aided in keeping the harbours of the fishing ports free of ice, thus permitting the fleet to operate throughout the winter.

The *Arras*, under Captain Barkhouse, operated in southwestern Nova Scotia in January and February, hauling out for annual overhaul on February 25. During April, May and early June the ship patrolled between Halifax and Yarmouth and sailed to the Grand Banks with the fishing fleet on June 10, calling at Canso en route.

In the course of his reference to the work on the Grand Banks Captain Barkhouse made the following comment:—

“On the banks we had eighteen French sailing fish vessels, twenty-two French trawlers sighted, twelve Portuguese sailing fish vessels, and seven Portuguese trawlers sighted. Two Newfoundland trawlers, and two British trawlers sighted.

“We had twenty-seven of our fleet this year at Newfoundland.”

Upon returning from the Banks in September the *Arras* resumed patrol duty in southwestern Nova Scotia. During the year this ship spent 189 days at sea, steaming 9,863 miles. Fifty-six foreign fishing vessels were boarded on 163 occasions. A number of rescues were effected and frequent assistance was rendered to the fishing fleet.

The *Arleux*, Captain H. P. Cousins, was equipped with a high-speed motor launch during the spring of 1936 and was therefore able to perform much more effective service than formerly in lobster protection work along the coast, particularly in the Gulf area where the ship was employed during the early part of July and again from the middle of August until early in November. From January 1 the *Arleux* was stationed in the Canso area as *mother* ship to the winter fishing fleet operating from Canso and Petit de Grat, Richmond county. The ship made a gallant effort to reach Miramichi bay on January 17 and 18 to assist the smelt fishermen there in recovering thousands of dollars' worth of smelt nets that were being carried out to sea, but unfortunately she was not able to get through the heavy drift ice in Northumberland strait, and therefore returned to Canso. From February 4 until February 23, when the ship was laid up at Lunenburg for annual overhaul, she was engaged in patrol and ice breaking between Halifax and Shelburne. On duty again April 23 the *Arleux* went to Northumberland strait for the opening of the lobster season and returned in early June to Halifax and patrolled the eastern district, paying particular attention to the protection of the three-mile limit. Another short patrol to the Northumberland strait was made in early July, but from July 11 to August 16 the ship was on duty on the Atlantic coast and in the bay of Fundy. From August 18 to November 6 the *Arleux* patrolled the Northumberland strait and the coasts of Prince county, Prince Edward Island, and Kent county, New Brunswick. A number of boats and traps used in the closed lobster area was seized and the ship's motor launch was found to be most effective in dealing with illegal lobster fishing. From November 7 to December 31 the *Arleux* was again on the Atlantic coast spending the greater part of that period in the Canso fishing area. During the year the ship steamed 10,570 miles, used the motor launch for 1,400 miles, and effected eleven rescues.

LUNENBURG SALT BANK FISHING FLEET

While the total number of vessels engaging in salt fishing was less than in 1935 and the total catch was somewhat smaller the catch per vessel was higher for all the trips in 1936 than in the year before. The following is the comparison:—

Trip	1936		1935	
	Vessels	Quintals	Vessels	Quintals
Frozen baiting.....	12	6,900	16	7,500
Spring.....	19	17,200	26	20,400
Summer.....	25	55,500	28	55,500
.....		79,650	.....	83,400

An encouraging feature was a fairly steady price for dried fish and an advance at the close of the year.

The vessels engaged in salt fishing were as follows, but those marked "F" also carried on fresh fishing: *C. A. Anderson*, *Beatrice Beck*, *Maxwell Corkum*, *Delewana II*, *Harriet & Vivian* (F), *Leah Beryl*, *C. J. Morrow*, *Mavis Barbara*, *Mabel Dorothy*, *John H. MacKay* (F), *Progressive II*, *Pan American*, *Haligonian* (F), *Mary Hirtle*, *Robt. J. Knickle* (F), *Pasadena II*, *Isabel Corkum*, *Gloria May*, *Ocean Maid*, *Bessemer* (F), *Howard Donald* (F), *Sir Ernest Petter* (F), *Ronald Singe* (F), *Isabel Spindler* (F), *E. F. Zwicker* (F).

Of these vessels the first twelve on the list made the frozen baiting, spring and summer trips, the next seven the spring and summer trips, and the others only the summer trip. The vessels averaged 3,186 quintals, the fares ranging from 2,100 quintals to 4,850 quintals.

THE FRESH FISHING FLEET

The number of large powered vessels engaging in fresh fishing during the winter and autumn months was greater than before. Fares were landed at North Sydney, Halifax, Lunenburg, Liverpool, Lockeport and Shelburne with regularity.

The famous racing schooner *Bluenose* was equipped with power and joined the fresh fishing fleet in September. Two vessels of this fleet were lost during the year, however, the *Shirley B. Corkum*, wrecked near Lockeport, and the *Bruce and Winona* on the Newfoundland coast. The *Arthur L. Lynn*, built to replace the *Shirley B. Corkum*, joined the fleet in October.

The vessels of the large powered type operating from the ports mentioned were the following, practically all of them hailing from Lunenburg: *Andrava*, *Archie F. McKenzie*, *Arthur J. Lynn*, *Bessemer*, *Bluenose*, *Cachalot 3rd*, *Dot and Hellie*, *Douglas and Robert*, *E. F. Zwicker*, *Francis S. Roue*, *Haligonian*, *Harriet and Vivian*, *Howard Donald*, *Irene Mary*, *Isabel F. Spindler*, *Jean and Shirley*, *John H. McKay*, *Julie Opp II*, *Kasagra*, *Kistine M. Lister*, *Lucille M.*, *Mahaska*, *Marion and Emily*, *Marguerite B. Tanner*, *Marjorie and Dorothy*, *Marshall Frank*, *Muriel Isabel*, *Opitza*, *R. B. Bennett*, *Robert J. Knickle*, *Ronald George*, *Silver Arrow*, *Sir Ernest Petter*, *Bruce and Winona* (lost), and *Shirley B. Corkum* (lost).

PROSECUTIONS

During the year there were 81 prosecutions following infractions of the Fishery Regulations and Act, 11 in Cape Breton island, 36 in the eastern mainland and 34 in the western district. There were also 238 confiscations.

NEW BRUNSWICK

With the exception of cod and haddock there were increased landings of all other chief varieties of fish taken in New Brunswick in 1936, with corresponding increases in landed and marketed values. The total production was almost one hundred and sixty million pounds or about 20,000,000 pounds more than the 1935 catch. Value to the fishermen increased by about \$217,000 and the marketed value was greater by nearly half a million.

In order of value the chief varieties taken were sardines, lobsters, herring, smelts, salmon, cod and oysters, and again the outstanding feature of the year's operations was the remarkable increase in the sardine fishery. This fishery has steadily increased since 1932, the catch and marketed value for the past five years being as follows:—

	Catch	Marketed Value
	lbs.	\$
1936.....	49,273,600	1,597,192
1935.....	37,499,800	1,335,279
1934.....	38,231,000	1,038,189
1933.....	26,022,400	622,531
1932.....	13,337,800	426,349

The run of sardines while not particularly heavy at any time was steady with a fair catch most of the season and there was not the heavy summer run that usually occurs.

The lobster catch was greater by about 166,800 pounds, due to heavier landings on the east coast during both fall and spring seasons. On the bay of Fundy shore less lobsters were taken due to the season being shortened. The smelt fishery, which is confined entirely to the east and north coasts of the province, increased by over one million pounds. In parts of Gloucester and Northumberland counties and throughout Restigouche county early smelt fishing was a failure and an extension to the season was granted to help the fishermen make up the catch. Due to the ice moving out of the Miramichi bay in January the river fishing was unusually good, but a tremendous loss in gear was suffered by the fishermen. The quality of the late fish was much superior to the early run which consisted largely of No. 2's.

The herring fishery produced over 52,000,000 pounds or about 4,100,000 pounds more than in 1935, but there was no corresponding increase in values as the catch on the east coast was mostly taken in the spring and large quantities were used for bait and fertilizer. On the bay of Fundy the price at weirs was less than that paid in 1935.

The catch of salmon was just slightly better than the 1935 catch. On the bay of Fundy the catch was less by 43,300 pounds but on the east coast it increased by over 70,000 pounds. An encouraging feature was a larger run of fish in the Miramichi during August.

The cod fishery was not successful, the catch falling off by nearly two million pounds, due entirely to reduced catches on the east coast particularly Gloucester county where the Caraquet salt fishing fleet operates. On the bay of Fundy the catch was greater by 1,300,000 pounds.

The clam flats of Charlotte county were heavily fished both for the canning and raw trade during the year. The total production was approximately 6,246,000 pounds, about the same as the previous year. Increased catches of shad were taken in all districts, the total catch being greater by over one-half million pounds and on the east coast the oyster fishery produced about 740 barrels more than in 1935.

The commercial fisheries of the inland district of the province yielded 1,183,000 pounds as compared with 740,200 pounds. The chief varieties taken were salmon, shad and alewives.

The table given below shows the total catch and values and similar information for the chief varieties taken:—

1936

Total quantity of all fish landed.....	lbs.	159,326,100
Landed value.....	\$	2,099,754
Marketed value.....	\$	4,399,735

	Lbs.	Landed Value	Marketed Value
		\$	\$
Sardines.....	49,273,600	337,168	1,597,192
Lobsters.....	5,649,900	692,125	916,850
Smelt.....	6,387,500	303,569	478,853
Herring.....	52,162,000	169,273	506,562
Salmon.....	1,727,900	217,139	256,338
Cod.....	13,147,700	117,223	178,667
Clams.....	6,246,200	34,219	71,614
Alewives.....	6,180,900	30,870	66,606
Oysters.....	1,821,800	35,178	58,508
Hake and cusk.....	6,080,300	21,541	46,740
Shad.....	1,729,600	51,941	58,871
Pollock.....	5,113,500	20,183	34,689
Haddock.....	785,100	19,618	21,597
Mackerel.....	1,018,600	13,095	21,535

1935

Total quantity of all fish landed.....	lbs.	139,028,000
Landed value.....	\$	1,882,451
Marketed value.....	\$	3,949,615

	Lbs.	Landed Value	Marketed Value
		\$	\$
Sardines.....	37,499,800	276,175	1,335,279
Lobsters.....	5,483,100	592,409	818,699
Smelt.....	5,273,900	266,296	429,840
Herring.....	48,033,800	197,906	508,150
Salmon.....	1,656,200	186,572	243,554
Cod.....	14,984,800	133,066	197,714
Clams.....	5,946,400	30,641	70,251
Alewives.....	4,896,900	28,920	64,894
Oysters.....	1,674,200	33,612	47,294
Hake and cusk.....	5,565,500	21,779	41,927
Shad.....	1,087,600	35,090	42,357
Pollock.....	3,205,800	19,045	29,013
Haddock.....	828,100	15,889	17,640
Mackerel.....	599,400	7,436	15,413

ANGLING IN NEW BRUNSWICK

Bay of Fundy Section.—Salmon fishing during the year could not be considered as being as good in this district as in 1935. The usual run occurred in the St. Croix river and a few fish were taken by angling at Milltown. On the Magaguadavic the run was larger and several fish were taken at Second falls and Brockway. In Gardner's creek and Tynemouth creek it was September before water conditions were favourable for the ascent of salmon. In Salmon river the water was low until the latter part of August but from that time until the end of the season salmon were plentiful and 34 fish weighing from 5 to 11 pounds were taken by anglers.

Trout fishing also was not as satisfactory as in 1935, being poor on the Magaguadavic river, Garnet stream, Black river and, in fact, most trout waters with the exception of lake Utopia where there was satisfactory sport.

Eastern District.—Throughout the early part of the season there was a rainfall which maintained good water levels and, generally speaking, angling was the best reported for years, larger numbers of non-resident and resident sportsmen taking advantage of excellent salmon and trout fishing.

The following rod catches of salmon were reported:—

	Salmon
Restigouche river.. . . .	4,280
Kedgewich river.. . . .	415
Upsalquitch river.. . . .	380
Patapedia river.. . . .	130
Jacquet river.. . . .	90
Nipisiquit river.. . . .	115
Tetagouche river.. . . .	10

On the Tabusintac river 370 salmon were taken. Many of these were caught during the spring with the barbless hook fly and were liberated alive.

Trout fishing in all parts of the district was better than in the previous year, 17,600 pounds being reported caught as compared with 9,000 pounds in 1935.

Inland Section.—Water conditions were most satisfactory during the entire 1936 season and the catch of sport fish, as a whole, was better than in 1935, but in some areas was not up to the 1934 catch. Conditions on the rivers and streams were good, providing free access for fish on their way to the headwaters.

On the Saint John River system 755 salmon were taken by angling, compared with 688 taken during 1935. Of grilse 1,182 were taken compared with

802 in 1935. Hartts Island pool alone produced 680 salmon and grilse during the year. The Tobique gave 454 salmon and 384 grilse, as compared with 444 salmon and 357 grilse in 1935. The Saint John and Salmon rivers, Victoria county, also showed increases, with combined catches of 98 salmon and 103 grilse.

The catch on the Miramichi river shows a very large increase over 1935 and 4,758 salmon and 22,989 grilse (including black salmon) were taken compared with 3,735 salmon and 4,526 grilse. Early fishing for black salmon is becoming more popular each year, particularly with sportsmen from across the border. The Miramichi has been showing a steady increase from year to year in grilse catch and conditions during 1936 were nearly perfect. It is generally conceded that the heavy stocking of Miramichi waters during 1930 and the change in minimum size of grilse that may be taken in nets is largely responsible for the heavy increase this year.

Nashwaak river yielded a catch of 25 salmon and 46 grilse and the effect of the improved fishway at Marysville is expected to make fishing on this river better from year to year.

Owing to the heavy rain and rise of water during the latter part of October it is not known what the results of spawning will be, but without doubt salmon were able to ascend well up the streams to the higher spawning grounds; in fact, salmon were reported to have made their way to points they were never known to have reached before.

PATROL SERVICE

On the bay of Fundy coast the *Gannet Rock* was again employed in patrol service at Grand Manan throughout the year. The boat was also used in removing sick persons from Grand Manan to the mainland for hospital treatment and in assisting disabled fishing boats. The *Gannet Rock* patrolled 7,131 miles during 1936.

The *Thresher* was in commission throughout the year as a general patrol boat for the Fundy district, although in April the engine became completely disabled and the boat was necessarily laid up for a time. During the lay-up period the *Ruth and Ann*, owned by Inspector Batson, was used with the *Thresher* crew on board. A new crude oil engine was subsequently installed in the *Thresher* at Meteghan, Nova Scotia, and the boat resumed patrol on September 16, and has since rendered efficient service. The *Ruth and Ann* patrolled 3,411 miles and the *Thresher* 6,080 miles during the year.

Local patrol boats were employed at Mace bay and Grand harbour for lobster protection.

In the Eastern district five chartered boats carrying crews of either two or three men were employed for the protection of the lobster, salmon, smelt and oyster fisheries for the following periods:—

Gulf Ranger, April 29—November 14;

Gulf Racer, May 16—November 30;

Gulf Rover, May 19—November 12;

Gulf Rambler, June 11—November 9;

Gulf Raider, July 12—November 23.

The *Gulf Raider* was used in Gloucester county, particularly in the Tracadie-Shippegan area and at Miscou and Shippegan islands and the other boats in Northumberland, Kent and Westmorland counties. From the middle of July until the middle of October the five craft were chiefly concerned with the protection of lobsters in the closed district and in the course of their work made the following seizures:—

	Traps	Rope
		fathoms
<i>Gulf Ranger</i>	1,293	8,420
<i>Gulf Racer</i>	528	2,030
<i>Gulf Rover</i>	2,344	12,235
<i>Gulf Rambler</i>	1,550	8,595
<i>Gulf Raider</i>	456	3,220

Referring to this work the District Supervisor reports as follows:—

"Practically all of this seized gear was fished without buoys which entailed many hours of monotonous dragging of the bottom of the strait to locate. All crews worked faithfully and were in a great measure responsible for trying to bring under control a very difficult illegal lobster fishing situation. In addition, some of these boats were employed in checking up lobster fishing licences, protection of berried lobsters and protection of the smelt fisheries during the smelt gill-net fishing season to prevent illegal fishing with bag and box-nets."

The *Gulf Racer* was sent to Richmond county, Cape Breton island, in May and remained there until July 21 to carry on lobster patrol in the size limit area.

The patrol boat *Brant*, owned by Inspector Williston, was employed in Miramichi bay during the fishing season.

It was also found necessary to use two of the regular patrol boats from Nova Scotia and one of the protection vessels for occasional patrol work in this district during the year.

PROSECUTIONS

During the year there were 75 prosecutions—3 in District No. 1, 52 in District No. 2 and 20 in District No. 3.

CONFISCATIONS

There were 470 confiscations—35 in District No. 1, 359 in District No. 2 and 76 in District No. 3.

PRINCE EDWARD ISLAND

The total catch of all varieties of fish for the Province was greater by 3,922,000 pounds with an increase in marketed value of \$46,651. The cod and herring account for the greater part of the increase but there were also increases in practically all the more important varieties except the lobster and oyster.

The catch of the lobster fishermen declined 459,000 pounds but there was a slight increase in marketed value of \$9,682. With the opening of the season weather conditions were favourable and there was an abundant supply of bait on hand but as the season progressed landings decreased. The fishermen fared better, however, in the fall season, the catch being 736,100 pounds as compared with 516,900 pounds in the fall of 1935.

A considerable increase of 1,666,900 pounds is shown in cod landings with an increase in marketed value of \$11,905. Increased catches were made in all parts of the province except in southern Kings where there was a slight decrease. The increase was due to a heavy run of large steak cod which appeared earlier than usual on the Gulf shore and also to the fact that this fishery was prosecuted to a much greater extent than in former years.

A general increase is noted in herring of 2,497,300 pounds in the catch with an increase in the marketed value of \$22,485. The bulk of the spring run was used for lobster and mackerel bait, a considerable quantity being sold as fox food as well. Fall herring which were plentiful in northern Queens and West Prince counties were pickled and found a ready local market.

There was a slight increase of 182,800 pounds in the catch of smelts with an increase of \$4,336 in marketed value. The fish taken in bag-nets during January and February were unusually small and disposed of locally for fox food, otherwise the marketed value would have been much greater.

The oyster fishery which was one of the most productive in the division suffered a severe decline due to a serious mortality occurring on the Hillsboro river beds and the beds in the tributaries to that river with the result that the catch there was about 800,000 pounds short. The total catch for the province was 1,348,400 pounds or a decrease of 654,400 pounds representing a loss to the industry of over \$17,000. Satisfactory progress, however, was made in the development of the private areas, particularly in the Malpeque and Bedeque bay areas and on some of the public beds in west Prince county.

The catch of mackerel was 263,100 pounds greater than in 1935 with an increase in marketed value of \$8,279. The spring catch was used principally for bait; the summer catch was consumed fresh, there being a good demand locally and the fall catch was manufactured into salt fillets and sold to the United States markets. Prices were maintained at a level equal to that of 1935.

An increase of 685,800 pounds is shown in hake and cusk with an increase in marketed value of \$8,708. On account of the low prices received the fishermen did not engage in this fishery to the extent they might have if higher prices could have been obtained. The bulk of the catch was exported in the green salted state while the quantity dried and sold locally exceeded that of former years.

The table given below shows the total catch and values and similar information for the chief varieties taken:—

1936

Total quantity of all fish landed.....	lbs.	24,813,800
Landed value.....	\$	725,417
Marketed value.....	\$	946,336

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	5,928,600	544,365	614,789
Cod.....	6,212,000	48,581	97,174
Herring.....	5,649,800	29,372	66,987
Smelts.....	1,184,300	37,408	53,896
Oysters.....	1,348,400	34,614	43,067
Mackerel.....	1,067,200	14,016	28,569
Hake and cusk.....	2,559,700	10,623	25,365
Clams.....	382,800	1,672	6,556
Quahaugs.....	156,600	686	3,129
Haddock.....	71,500	1,185	2,550
Silversides.....	141,400	1,283	1,414

1935

Total quantity of all fish landed.....	lbs.	20,891,800
Landed value.....	\$	640,764
Marketed value.....	\$	899,685

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	6,387,600	467,804	605,107
Cod.....	4,545,100	39,276	85,269
Herring.....	3,152,500	23,111	44,502
Smelts.....	1,001,500	35,055	49,560
Oysters.....	2,002,800	46,973	60,246
Mackerel.....	804,100	11,462	20,290
Hake and cusk.....	1,873,900	7,831	16,657
Clams.....	347,200	1,508	5,318
Quahaugs.....	190,000	935	3,723
Haddock.....	64,600	1,143	2,162
Silversides.....	223,800	2,064	2,064

ANGLING

The waters of Prince Edward island are particularly suitable for brook and sea trout. There are numerous mill ponds and clear cool spring-fed streams. There are, however, no great possibilities for salmon angling as these fish only ascend the larger streams and then only late in the year.

Water conditions were favourable throughout the 1936 season and angling was carried on successfully. Fishing in Dunk river was good, a fairly large run of trout appearing during the latter part of the season. In the principal streams in Queens county, East river, Bonshaw, Winter, Wheatley, Millvale, Vernon, Guerny, Hope and Black rivers, good catches of sea trout were taken. Fishing in Vernon river showed a marked improvement over former years. In Blooming point and Point de Roche ponds there were good catches during the early part of the season. In Glenfinnan lake rainbow trout fishing was very good during July but little fishing was carried on during the remaining part of the season. In Kings county there was good fishing in East lake, North lake, Naufrage, Morell and Fortune rivers. Some very large sea trout were taken weighing from three to four pounds each. In Morell river some salmon grilse were taken with fly.

Spawning conditions in all the rivers and streams throughout the district were favourable and large runs of trout were reported as having ascended the streams. There was a scarcity in the fall run of salmon throughout the district.

FISHERIES PATROL SERVICE

Seven local patrol boats were employed during the year to protect the lobster fishery as follows:—

Boat	Dates Employed	Area	Miles Patrolled
<i>Langholm</i>	July 1—Oct. 31.....	Prince West.....	8,513
<i>F. D. B. 1</i>	July 16—Oct. 31.....	".....	2,768
<i>F. D. B. 11</i>	July 22—Nov. 10.....	Malpeque bay.....	4,182
<i>Velox</i>	Aug. 6—Oct. 20.....	Victoria-Belle river.....	2,555
<i>Uno</i>	Aug. 15—Oct. 24.....	Georgetown.....	1,636
<i>Tracadie</i>	July 16—Oct. 15.....	Malpeque-North Lake..	2,339
<i>Seaview</i>	Aug. 15—Oct. 9.....	".....	3,339

The *F.D.B. 1* and *11* are owned by the department and the others were employed on a charter basis. The *Langholm* is a new boat built especially for the service in 1936.

Some outside boats were necessary occasionally in the district and the *Arleux*, with her fast motor launch, was employed on the West Prince coast from September 8 to October 29. The patrol boat *Venning* patrolled the southern coast of the island from April 1 until May 20 to prevent illegal fishing before the season opened and to check on licences and spawn lobsters later. The patrol boat *Gilbert* was used in Kings county during September and the chartered boat, *Gulf Rambler*, from New Brunswick was used in west Prince from the latter part of June until mid-July.

In all, the patrol boats were obliged to destroy 8,590 lobster traps, 68,224 fathoms of rope, seize 1 motor boat and liberate over 5,000 lobsters.

PROSECUTIONS

During the year there were 47 prosecutions—44 in Prince Edward Island and 3 in the Magdalen Islands.

DEPARTMENT OF FISHERIES

CONFISCATIONS

There were 88 confiscations—82 in Prince Edward Island and 6 in the Magdalens.

MAGDALEN ISLANDS

The total quantity of all fish landed in the Magdalen Islands was slightly less than in 1935 but landed and marketed values increased. The year's total production was 23,139,000 pounds with landed value of \$293,488 and marketed value of \$423,458, as compared with 23,302,400 pounds with landed value of \$286,968 and marketed value of \$379,790 in 1935. The most valuable fishery is the lobster and while there was a slight decrease in the catch of 201,100 pounds there were increases of \$22,637 in landed value and \$57,661 in marketed value. The catch of cod was 610,100 pounds greater than in the year before. There was a slight decrease in landed value but some increase in the marketed value, \$5,450. Owing to the low prices for dried cod the pack was only half the quantity put up in 1935. Most of the fish were green salted and sold at a price so low that the fishermen were indifferent about handling them. Herring appeared early and were very plentiful, resulting in catch increase of 1,410,900 pounds, landed value increase of \$2,982 and marketed value increase of \$12,629 when compared with the previous year.

The mackerel fishery was almost a failure, owing to scarcity of spring fish, particularly in Pleasant bay. Only 1,455,500 pounds were landed as compared with 3,404,800 pounds in 1935. The short catch did not force a higher price as there was heavy catches on the mainland.

The attached table shows the total catch and value of 1936 as compared with 1935, and gives similar information regarding each of the chief varieties taken:—

1936			
Total quantity of fish landed.....	lbs.	23,139,000	
Landed value.....	\$	293,488	
Marketed value.....		423,458	

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	1,969,600	196,960	251,426
Cod.....	5,865,900	52,885	75,040
Herring.....	13,574,600	27,429	68,973
Mackerel.....	1,445,500	11,867	23,126
Smelts.....	25,500	1,398	548
Clams.....	170,000	850	850
Halibut.....	5,000	250	250

1935			
Total quantity of all fish landed.....	lbs.	23,302,400	
Landed value.....	\$	286,968	
Marketed value.....		379,790	

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	2,170,700	174,323	193,765
Cod.....	5,255,800	58,492	69,590
Herring.....	12,163,700	24,447	56,344
Mackerel.....	3,404,800	24,061	55,142
Smelts.....	48,400	2,755	973
Clams.....	254,000	1,270	1,270
Halibut.....	5,000	250	250

THE DIVISION GENERALLY

LOBSTER CANNERIES, INSPECTION AND GRADING

During 1936 licences to pack lobsters were issued to 259 canneries, or 12 less than in 1935, and 255 canneries were in operation as compared with 267.

Comparative figures by provinces show the following cannery distribution:—

	1936	1935
Nova Scotia.....	76	78
New Brunswick.....	80	84
Prince Edward Island.....	84	89
Magdalen Islands.....	15	16

Regular inspections of all canneries were carried out by qualified inspecting officers. The effect of close inspection can be definitely seen in the improvement in quality of pack produced, and while this is of economic importance to the industry the willingness of cannery generally to improve their canneries and methods of packing is indicative of their progressive attitude with regard to the advantages of careful inspection of the canneries and the product.

The checking of weights of drained meat contents of the lobster pack was an important part of all inspections and here again an improvement is being shown. During the year only 23 instances of suspected underweights were found, as against 29 during 1935, and in only 14 instances in 1936, as against 16 in 1935, was it found necessary to mark affected pack "Underweight" as required by the Meat and Canned Foods Act.

During the year all canneries were graded by the fisheries inspectors and they all obtained sufficient marks under the grading scheme to permit them to operate. In other years it had been felt that owing to the number of inspectors grading canneries a uniform grading might not obtain. In order that grading might be made more uniform, arrangements were completed with the Biological Board to assign Dr. Ernest Hess to visit and independently grade as many canneries as possible. During the spring season Dr. Hess visited canneries in Cape Breton, the eastern section of the mainland, and the Magdalen Islands. During the fall season he covered canneries operating in the fall district in Nova Scotia, New Brunswick and Prince Edward Island. Generally speaking, his findings were that the canneries visited had been competently and uniformly graded by fisheries inspectors.

INSPECTION OF PICKLED FISH AND CONTAINERS AND FISH-CURING ESTABLISHMENTS

Early in the year the regulations under the Fish Inspection Act were thoroughly revised. The new regulations, which became effective on May 8, provided, among other things, clearer specifications for containers and the materials used in their construction and more detailed and definite requirements in connection with the grading of herring, of the various qualities, and the curing of pickled herring and mackerel. An initial step was also taken in the grading of oysters and provision made for the proper marking of containers.

Supervisor Robert Gray, who has charge of the work under the Fish Inspection Act in this division, reports as follows with regard to 1936 inspections:—

"Three thousand five hundred and forty-two visits are reported as having been made during the season for educational purposes, but I am under the impression that more work of this nature is carried out than reported because it is almost impossible for an inspector to conduct an inspection of either empty or full containers without pointing out where improvements could be made in some shape or form.

"Four thousand and fifty-nine inspections of fish-curing premises, fish houses, curing utensils, etc., were conducted during the year, and conditions as to cleanliness seem to be very satisfactory. One fish house was condemned, but not because of being unsanitary.

"Three hundred and eighty-four thousand three hundred and eighteen empty containers were inspected, of which 693 were reconditioned and 1,158 condemned.

"Of the 7,815 barrels of alewives inspected, only one barrel was reconditioned.

"A total of 43,980 barrels, 448 half-barrels, 10 quarter-barrels, and 491 pails of mackerel were inspected, of which 2,530 barrels, 4 half-barrels and 2 pails were reconditioned and 628 barrels and 4 half-barrels found to be 'below quality.'

"The inspection of 11,352 barrels, 9,307 half-barrels, 38 quarter-barrels and 4,902 pails of herring resulted in 628 barrels, 213 half-barrels and 109 pails requiring reconditioning, and 162 barrels, 52 half-barrels and 33 pails being found to contain 'below quality' fish.

"Of 288,401 boxes of hard cured smoked round herring inspected only 20 boxes were stencilled 'below quality' and 3,912 boxes were reconditioned.

"Seventeen thousand one hundred and eighty-six barrels and 2,638 boxes of oysters were inspected, 5 barrels of which had to be reconditioned and 33½ bushels confiscated, because of being under the regulation size, and this led to eleven prosecutions.

"In addition, I inspected 76 empty mackerel barrels, 3 of which had to be reconditioned, 17 barrels, 43 half-barrels and 2 quarter-barrels of mackerel, 2 barrels and 4 half-barrels of herring.

"The regulations governing the curing and marketing of herring now provide for six different qualities—3 under Grade 'A' and 3 under Grade 'B,' and as those qualities are well defined, fishermen should now be able to take the utmost value out of their herring by carefully adhering to those selections.

"With regard to the 1936 inspection of oysters, there is little further to be said than that, since culling as to thickness was introduced, in addition to that of length, containers containing 5 per cent or more of what are termed 'thin lipped' oysters have been officially stamped as such and thereby dealers are guided as to the type of oyster they are purchasing.

"During the year there were only six reinspections, consisting of 200 empty barrels, 56 barrels of alewives, 65 barrels and 1 half-barrel of mackerel and 38 barrels of herring."

The comparison of work performed under the Fish Inspection Act for the past three years is as follows:—

	1936	1935	1934
Educational visits.....	3,542	1,991	1,705
Inspection of premises.....	4,059	2,416	2,926
Inspection of empty containers.....	38,439	78,512	63,655
Inspection of pickled alewives.....	7,815	8,325	6,950
Inspection of pickled herring.....	11,334 x 9,317 y 38 † 4,902 p	16,781 x 14,020 y 34 † 4,618 p	18,928x
Inspection of pickled mackerel.....	43,987 x 491 x 12 † 149 p	40,384 x 245 x 44 p	43,600
Inspection of smoked herring.....	228,401 b	376,185 b	238,681
Inspection of oysters.....	17,168 x 2,638xx	17,763 x 3,022xx	6,153 x 1,436xx

x bbls. y half bbls. † quarter bbls. p pails. b 18 lb. boxes. xx boxes.

ILLEGAL FISHING

With economic conditions as they are on certain sections of the coast and lack of employment in other lines of fishing there has been a strong incentive, particularly in the areas adjoining the late lobster fishing district, to fish and pack lobsters during the close season and it has been with the greatest difficulty that the situation in these areas has been kept under control and prevented from spreading to other areas. Speaking of the division as a whole, conditions with respect to illegal fishing have greatly improved of recent years, particularly in the inland areas and the river estuaries where salmon, oyster and smelt poaching was a common practice. With the support of the public and splendid co-operation from the Royal Canadian Mounted Police, provincial officers, fishermen's associations and fish and game associations the difficulty of illegal fishing has been effectively dealt with, and inland as well as on the coast generally, with the exception of the areas referred to, conditions have been satisfactory. In

these particular areas, however, which are just north of the Chockpish-Carey point lobster boundary, both on the New Brunswick and Prince Edward island coasts, including portions of Kent, Northumberland and Prince counties, the most determined efforts were made to carry on illegal lobster fishing and packing on a commercial scale. It was found necessary to concentrate the greater part of the patrol fleet there and to make additions to the land forces. Some difficulty was also experienced along Northumberland strait on the Nova Scotia side as well as the Prince Edward island side east of the late fishing district but there it was well controlled and was a minor affair compared with the situation beyond the northern boundary.

The enormous extent to which efforts were made to fish illegally is indicated by the seizure of traps and gear. In the areas referred to almost 18,000 lobster traps and 110,000 fathoms of rope were destroyed and over 20,000 lobsters liberated.

LOSS OF LIFE

Fishing is a most hazardous occupation and it is with regret that a loss of life of twenty-nine fishermen is reported during the year. Of these nineteen were from Nova Scotia, two from New Brunswick and one from the Magdalen Islands.

LOSS OF GEAR

Heavy loss of gear, estimated at \$230,000 in value, was caused by storms and ice in 1936. The largest single item was a \$65,000 loss of small nets and equipment on the east coast of New Brunswick, mostly in Miramichi bay, which was caused by a large ice-pan breaking away and being carried to sea in January. Most of the balance of the estimated loss was incurred through the destruction of lobster traps and gear by storms.

REDUCTION OF FISH WASTE AND COARSE FISH

By-product output in the Maritime Provinces during 1936 included 53,161 gallons of medicinal cod liver oil, valued at \$30,718 and 124,874 gallons of common fish oil with a total value of \$51,961. All but 3,100 gallons of medicinal oil, and the larger part of the other oil was produced in Nova Scotia. Fish meal production was 6,774 tons with a total marketed value of \$293,584.

In the Magdalens, by-product output included 600 gallons of fish oil, valued on the market at \$150, and 3,634 gallons of seal oil, valued at \$924.

CO-OPERATION

Close contact was maintained by supervisors and inspectors with organizations of commercial and sport fishermen as well as with provincial officials and the Royal Canadian Mounted Police in the various districts of the division. An arrangement similar to that effected in New Brunswick some years ago was made in Nova Scotia early in the year when the provincial forest rangers and game wardens were appointed fishery guardians without pay and the fishery inspectors were appointed honorary game wardens. It is desired to express appreciation of the co-operation offered and assistance rendered by the officers and members of the fish and game protective associations of the three provinces, the directors and officers and many of the members of the United Maritime Fishermen, and the Royal Canadian Mounted Police. The latter body has assisted most efficiently in the enforcement of the fishery regulations.

HAIR SEALS

Hair seals are very destructive to the commercial fisheries, especially the salmon and smelt fisheries, and the bounty which was paid some years ago was

again restored in July, the amount granted for this purpose being \$7,500 and the rate per seal \$1.50. From the time the bounty became effective until the end of December an amount of \$3,299.50 was expended, covering payment of 2,153 claims. About three-quarters of the seals were killed along the mainland of Nova Scotia.

The following table shows, by provinces, the number of claims and the amount paid by provinces:—

	Claims	Amount
		\$ cts.
Nova Scotia.....	1,714	2,571 00
New Brunswick.....	290	435 00
Prince Edward Island.....	109	163 50
Magdalen Islands.....	40	60 00
Total.....	2,153	3,229 50

STAFF

During the year there were more than the usual number of changes in staff in the division.

S. T. Gallant, Supervisor for Prince Edward island and the Magdalens, retired after long service and was temporarily replaced on May 20 by J. J. Larabee, who was in the employment of the department at that time in another capacity. Temporary Inspector Neil McLeod, of East Prince, left the service on March 31. This position was filled by the appointment of P. C. Martin on June 11.

In New Brunswick the service suffered a serious loss through the untimely death of Inspector J. J. Jardine, of Campbellton, on October 4. Mr. Jardine was one of the most promising young inspectors in the division and his loss was keenly felt by the industry and others associated with him. A. D. Levesque, of Grand Falls, was appointed inspector in Victoria and Madawaska counties on October 1 following the retirement of Inspector J. T. Bell.

In Nova Scotia the only change in the permanent staff was the retirement of Inspector W. H. Vaughan, Western shore.

ANNUAL REPORT OF CHIEF SUPERVISOR OF FISHERIES, MAJOR J.
A. MOTHERWELL, WESTERN DIVISION, (BRITISH COLUMBIA)
FOR 1936

Supplies of the several varieties of fish during the year 1936 were quite satisfactory. Particularly was this so in the cases of salmon and herring. Large runs of both these fish were available to the fishermen and it is felt that larger tolls could have been taken without any danger from the standpoint of conservation. A number of factors influence the quantity of any species of fish taken; for instance, market situation, strikes of fishermen, and weather conditions. All three factors had considerable influence in the year under review.

It is considered desirable to mention again the inclination on the part of the public and others to accept catch or pack figures as necessarily indicating the abundance of fish in any season. In the case of salmon, particularly, the smaller packs from time to time in certain areas are often the result of departmental regulations expressly made for the purpose of permitting a larger escapement to the spawning grounds. This is a method used for the restoration of any run which it may be felt requires special attention because of over fishing or because of a reduction in the number of returning fish for some other reason such as unusually severe frosts which may destroy the eggs on the

CANNED SALMON

41731—41732

52,624 cases in the 4-year cycle brood year of 1932, and 93,029 cases in the 5-year cycle brood year. The escapement to the spawning grounds was good.

Rivers and Smiths Inlets.—It was expected that fishing operations at these points would be very good in 1936. The pack, however, amounted only to 59,138 cases, compared with 166,686 in the previous year, 86,110 in the 4-year cycle brood year of 1932, and 92,872 for the 5-year cycle brood year of 1931.

There was a very large run of sockeye to these two inlets and had it not been that fishing was interrupted by a dispute there is no doubt that the catch would have been one of the largest on record.

The upper boundary at Rivers inlet was placed one-half mile farther out into deep water which gave the fish added opportunity to pass safely beyond the fishing area and this, of course, assisted the escapement.

The number of sockeye reaching the spawning grounds of both inlets was very large and the result should be excellent returns in the cycle years. However, the spawning beds suffered later from abnormally severe freshets which caused considerable damage, although it is not possible to estimate just how much.

There was 2,210 gillnet licenses issued for salmon fishing in the two inlets.

Fraser River Area.—A surprisingly large pack of sockeye resulted from the fishing operations in the Fraser River district, totalling 164,408 cases, as compared with a pack of 57,212 cases in the preceding year, and 83,447 cases in the brood year, 1932. The Fraser River sockeye is predominantly a 4-year fish.

There being no late run of sockeye during 1936 and no run of pinks to the Fraser system, salmon purse-seining was not permitted in any portion of District No. 1; therefore, all sockeye caught in that district were taken by means of gillnets.

The quality of the greater percentage of the early portion of the run, when not taken too far from salt water, was equal to that of the best of other years, the colour and oil content being particularly good.

There has been considerable speculation as to the source of this unusually large run, and as to the channels through which the fish proceeded to the Fraser. The bulk of the run appears to have reached the Chilco River system, the Birkenhead River system, and Pitt Lake system, but did not ascend to the upper reaches of the Fraser river, to which the huge fourth year run of years ago always proceeded.

Changed fishing conditions in Puget Sound waters may have been a factor making for increase in the quantity of sockeye available to the Fraser River gillnetters.

There has always been a run of sockeye to the Fraser by way of Johnstone straits but there is no doubt that the quantity using this channel in 1936 was very much larger than has been observed for many years.

In attributing the large run to the Fraser to the Johnstone Straits approach, some authorities point to the fact that the traps operated in Canadian waters on the southwest coast of Vancouver island did not obtain any large quantity of the fish; in fact, the percentage taken by this year was only 1.7 per cent of the total pack from the run of sockeye proceeding to the Fraser river and packed in the Fraser river, Puget sound, and Sooke areas.

In any event it will be seen by Statement No. 15 that the total pack of sockeye taken on their way to the Fraser river, in the Fraser River district, the Puget Sound area and the Canadian trap area shows an increase of 83,662 cases over that of the brood year of 1932. This fact might lend some support to the claim that the run via Johnstone straits was largely responsible for the increased supply.

Cohoes.—The total pack of cohoes again shows large in comparison with that of previous seasons and is 27,914 cases greater than the average for the last five-year period, as shown below. Market conditions have been responsible in the last two seasons for the larger pack.

The following figures show the 5-year average packs of cohoes during the past fifteen years:—

	Cases
1922-1926..	136,357
1927-1931..	142,294
1932-1936..	184,429

Pinks.—At the first of the season it was felt that it might not be desirable to put up any large quantity of pinks but as the season advanced market conditions showed improvement, with the result that 591,532 cases were packed. This is the largest total since 1930 and compares with 435,364 cases in the brood year, 1934. In the light of marketing experience following the close of the season the large pack appears to have been justified.

Two-year average packs of pinks during the past fourteen years were as follows:—

	Cases
1923-1924..	549,246
1925-1926..	609,196
1927-1928..	519,989
1929-1930..	794,953
1931-1932..	215,355
1933-1934..	483,961
1935-1936..	553,249

Chums.—Chum pack, totalling 597,487 cases, was the largest since 1928, but it could have been materially increased had market prospects appeared to justify larger production. Extra precautions taken in connection with fishing boundaries in some of the favoured areas, in order to give greater protection, had the effect of curtailing the catch somewhat.

The accompanying table shows 5-year average packs of chums during the past fifteen years:—

1922-1926..	511,324 cases
1927-1931..	461,491 “
1932-1936..	424,133 “

EXPORTS OF CANNED SALMON FROM PORT OF VANCOUVER

Following is a statement showing the exports of canned salmon, according to countries of destination, from the Port of Vancouver, during the year:—

	Cases		Cases
Africa, South..	58,502	Africa, West..	6,089
Africa, East..	2,638	Africa, North..	135
	Cases		Cases
Australia..	310,669	India..	7,431
Belgium..	12,668	Malta..	420
Bolivia..	1,120	Mauritius..	450
Canary Islands..	40	Mesopotamia..	50
Central America..	478	New Zealand..	65,023
Chile..	1,310	Panama..	1,110
China..	551	Palestine..	490
Colombia..	6,225	Peru..	180
East Indies..	514	Philippine Islands..	6,636
Eastern Canada..	329,358	South America N.O.C..	4,722
Egypt..	415	Straits Settlements..	504
Fiji Islands..	14,898	South Sea Islands..	4,418
France..	113,646	Sweden..	58
Germany..	110	United Kingdom..	390,775
Gibraltar..	30	U.S.A. Pacific..	20,913
Holland..	137	West Indies..	15,747
Irish Free State..	750		

Total number of cases thus exported.. 1,379,210

CANNED SALMON, FRENCH QUOTA

The total quota of canned salmon available to Canadian salmon operators in the French market for the calendar year 1936 amounted to 35,000 metric quintals, or a total of 7,700,000 pounds, compared with a total of 49,660 metric quintals, equal to 10,923,889 pounds, in the preceding year.

As in previous years, the quota was distributed amongst the Canadian salmon canners on the basis of the total pack of pinks and chums by the respective operators during the operating season of 1935.

Certificates of Origin issued at the Vancouver office numbered 411, representing an equal number of shipments to France.

CANNED SALMON INSPECTION

The year 1936 was the first season under the new system of inspection, whereby a specially qualified chief chemist and two assistant chemists were appointed to take over the duties previously performed by a board composed of three inspectors chosen from the industry by the Government.

The new system went into effect on the first of the fiscal year, namely April 1st, 1936. Suitable quarters for the inspection laboratory were obtained on the Ballantyne pier. Over the Ballantyne pier passes approximately 80 per cent of the salmon pack of British Columbia each year and obviously this is the most desirable site for the inspection quarters, as, apart from the convenience, there is also the question of economy in the drawing of samples for examination. The cost of drawing samples is very low compared with the cost which would be involved had another site been selected.

The inspection laboratories have been well equipped with facilities suitable for an examination which must be as thorough as it is possible to make it. Keen competition in the canned salmon markets of the world necessitates assurance that the British Columbia product, which obtains the government inspection certificate, be of first-class quality.

Commencing on April 1st, the inspection fee was reduced to one-half cent per case; one cent per case had been charged previously. This reduction has relieved the canners of a substantial expenditure while still leaving an annual revenue which may be expected to offset in large measure, if it does not entirely meet, the expenditures by the department in connection with canned salmon inspection.

The following statements give the particulars of inspections made during the calendar year:—

Number of inspections made.....	2,966
Total number of cases inspected.....	1,823,931½
Total number of cases below certificate standard.....	26,554½
Total number of cases available for certificates.....	1,797,377

DETAILS OF CANNED SALMON INSPECTION ACCORDING TO SPECIES

Species	Number of cases inspected	Number of cases below certificate standard	Number of cases eligible for certificates
Sockeye.....	423,756½	16,972½	406,784
Springs.....	27,243	147	27,096
Steelheads.....	1,050	.....	1,050
Bluebacks.....	33,752	384	33,368
Coho.....	210,371½	878	209,493½
Pinks.....	574,011	2,031	571,980
Chums.....	553,747½	6,142	547,605½
Totals.....	1,823,931½	26,554½	1,797,377

PARTICULARS OF NON-CERTIFIED CANNED SALMON ACCORDING TO SPECIES

Species	Below grade B	Grade B	Tips and tails	Totals
Sockeye.....	160	13,755½	3,057	16,972½
Springs.....		147		147
Steelheads.....			384	384
Bluebacks.....		552	326	878
Coho.....	142	1,889		2,031
Pinks.....	687	5,455		6,142
Chums.....				
Totals.....	989	21,798½	3,767	26,554½

Later in this report will be found the first annual report of Mr. F. Charnley, Chief Chemist, covering the operations of the Inspection Laboratory.

FRESH SALMON IMPORTS

The following statement gives details of the quantity of fresh salmon imported into the province, most of the fish being used in canning:—

—	Sockeyes	Springs	Cohoes	Chums	Totals
From Alaska (frozen).....		851	3,802	378	5,033 cwts.
From Alaska, used for canning.....	216		16,316		16,532 cases
From Washington state, used for canning.....	62		5,945		6,007 "

These operations vary from year to year, according to the price at which the supplies can be obtained. During the season under review rather unusual conditions permitted the imports, notwithstanding the duty.

FRESH SALMON EXPORTS

From the statement given below it will be observed that the exports of fresh salmon from the province to points outside Canada were all to Washington state. A considerable percentage of the fish thus handled were sockeyes, which it has been permissible to export since the removal of the export embargo on this species in the year 1935.

Export operations in 1936 were largely due to the unusually big run of sockeye to the Fraser river which resulted in a surplus supply which could not be handled at the Canadian canneries. This, of course, is an unusual condition.

—	Sock- eyes	Springs	Cohoes	Chums	Steel- heads	Blue- backs	Total
To Washington State....	181,904	254,474	679	271,803	13	300	709,173 fish
Equivalent in canned pack.....	16,611	52,713	100	20,708	2	18	90,152 cases

FROZEN SALMON—FRENCH QUOTA

During the years 1934 and 1935 there was a French quota system applied to Canadian frozen salmon. This quota system was abolished however, commencing with the year 1936.

DRYSALTED SALMON

Under the operations of the British Columbia Salt Fish Board, which was established under the federal Natural Products Marketing Act, the total quantity of drysalted salmon permitted to be packed for the season 1936-37 amounted to 31,950 boxes, apportioned among thirty plants. This was a reduction of 3,050 boxes from the total allotted for the preceding year. Had the demand been greater, the quantity of drysalted salmon would have been increased very materially, as the runs of chums, the variety of salmon most commonly used for dry-salting, were excellent.

The statement below shows the pack of the several varieties of drysalted salmon since 1925:—

—	Sockeye	White Springs	Cohoos	Pinks	Chums	Totals
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.
1925.....		4,580		2,137	131,737	138,454
1926.....					139,858	139,858
1927.....					81,170	81,170
1928.....			48		170,205	170,253
1929.....					77,362	77,362
1930.....				1,291	114,932	116,223
1931.....	520	9,743	4	40,371	336,055	386,693
1932.....		8,142			119,147	127,289
1933.....		89		7,469	75,317	82,875
1934.....			2		90,979	90,981
1935.....	4	1,354	34	6,173	139,076	146,641
1936.....		2,780		76	150,637	153,493

POWER BOATS IN SALMON GILLNET FISHING

There was an increase of 13 per cent in the number of power boats used in salmon gillnet fishing in District No. 2 during 1936 as compared with the number used in the previous year. Statement No. 14 shows that the trend is constantly upward, the number of power boats used in the area having increased from 85 in 1924 to the total of 3,173 in the year under review.

LICENCES

Statement No. 13 gives comparative figures as to licences issued in connection with salmon fishing since 1925. This statement indicates that during the last four years the number of licences had been fairly constant, except that those issued in connection with trolling have shown a considerable increase, the total being 3,511 in 1936, which meant an increase of 404 licences or 13 per cent over the number issued during the preceding season.

HALIBUT

While there was a reduction of 3,022 hundredweights in the quantity of halibut landed at British Columbia points as compared with the total for the previous year, the landings by Canadian vessels at these ports, approximately 105,900 hundredweights, exceeded those for 1935 by nearly 4,000 hundredweights and, in fact, were the largest for a number of years.

It will be seen by the following statement that the total landings at the port of Prince Rupert by Canadian and United States vessels show a considerable reduction from those of seasons prior to 1935. This was largely due to the fact that, as the result of voluntary arrangements among United States halibut fishermen, there was a lay-over after every trip and Seattle fishermen felt that they

would prefer to spend this idle time at their homes rather than in the north and hence marketed a greater part of their catches in Seattle. The fact that the prices received for halibut in Seattle were higher than in the north was, of course, a material factor in the situation.

CANADIAN AND UNITED STATES HALIBUT LANDINGS IN BRITISH COLUMBIA

Year	Vancouver and New Westminster	Prince Rupert	Butedale	Vancouver Island Points	Totals
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.
1930.....	11,387	239,617	978	2,814	254,796
1931.....	8,498	167,757	3,627	2,123	182,005
1932.....	11,883	148,615	6,677	1,672	168,847
1933.....	13,436	144,065	10,431	2,440	170,372
1934.....	16,113	150,476	13,297	2,716	182,602
1935.....	22,351	129,586	15,713	3,493	171,143
1936.....	20,777	131,830	11,522	3,992	168,121

Another reason for the smaller total landed at Prince Rupert in 1936 was the washout caused on the Canadian National railway, east of Prince Rupert, by abnormal freshets. Transportation on the railway was discontinued for the period May 30 to July 17, and during that time, of course, no halibut shipments could be made east from Prince Rupert by rail.

The Canadian operations were conducted under the British Columbia halibut marketing scheme set up under the Natural Products Marketing Act. The operations of the board were apparently satisfactory.

HALIBUT LIVER PRODUCTION

The landings by Canadian vessels of halibut livers show a steady increase each year. The statement given below shows landings of 1,897 hundredweights in 1936 as against 688 hundredweights in 1933 and also shows that landings of halibut livers have made a very considerable addition to the earnings of the fishermen.

Year	Cwts.	Marketed Value	Average per Cwt.
		\$	\$
1933.....	688	13,794	20.05
1934.....	1,562	36,439	23.32
1935.....	1,812	80,513	44.43
1936.....	1,916	96,311	50.27

HERRING

Due to intensive fishing of late years, particularly in the Vancouver Island area, for the purposes of drysalting and the manufacture of meal and oil, some apprehension has been voiced as to herring conservation.

In the year 1930 an investigation of the herring supplies was commenced by officers of the Biological Board (Fisheries Research Board) and it is being continued with a view to acquiring all possible information regarding the life of the herring so that, if necessary, additional regulations can be made which will prevent danger of depletion of the runs. Up to the present time, however, there has not been any definite evidence obtained to show that the runs are in danger, although there is suggested possible shortage in one small area.

Salmon trollers have been fearful that the intensive herring fishing would result in too great a reduction in the quantity of herring available to the salmon as food. During the year a committee was named, composed of the Chief Supervisor of Fisheries for the province, the Assistant Commissioner of Provincial Fisheries at Victoria, and the Director of the Biological Board Station at Nanaimo, to examine into the question of probable herring supply for the 1936-37 season and to advise what, in its opinion, would be a reasonable quantity which might be permitted to be taken in the several areas on the east and west coasts of Vancouver island, where commercial fishermen have operated in the past.

Pursuant to the committee's report regulations were adopted fixing annual catch limits as follows:—

<i>East coast, Vancouver island</i> , which embraces the area from Beachyhead at the south end of Vancouver island to a line from cape Scott to cape Caution, a total of		25,000 tons
<i>West coast, Vancouver island</i> , which extends from Beachy head to cape Scott, a total of		40,000 "
subdivided as follows:—		
Barclay sound, seining area No. 23	not more than	15,000 "
Clayoquot sound, seining area No. 24	" " "	5,000 "
Nootka sound, seining area No. 25	" " "	10,000 "
Kyuquot sound, seining area No. 26	" " "	10,000 "
Quatsino sound, seining area No. 27	" " "	5,000 "

On December 10 the Barclay sound quota was increased by 5,000 tons, making a total of 20,000 tons for that area for 1936-37 only.

The intention was that in the aggregate the catch westerly of Barclay sound, while not exceeding the limits in any of the subdivisions as specified, should not exceed a total of 25,000 tons.

Herring fishing commenced on October 1 on the east coast of Vancouver island and the fish were present in such abundance that catches were only limited by the capacity of the salteries. These establishments obtained their requirements by November 28 and east coast herring seining ceased voluntarily on that date. At that time there were still large quantities of herring showing along the eastern shores of the island and spawning in this area was generally satisfactory.

On the west coast there was also an abundance of herring. This was particularly the case in Barclay sound where some seine fishermen made the statement that they had not seen such large schools in all their experience in that district.

In District No. 2, which is that portion of the coast north of Vancouver island, herring fishing, apart from the vicinity of Prince Rupert, has hitherto been practically negligible. This year, however, fishermen prospected many of the inlets in the Namu, Bella Coola and Ocean Falls districts with the result that abundant supplies of herring were found, particularly in Cousins inlet.

Advantage of this new supply was taken by the fishermen operating for the Namu and Prince Rupert reduction plants and by seiners employed by the reduction plants located on the west coast of Vancouver island.

DRYSALTED HERRING

Under the arrangements of the British Columbia Salt Fish Board for the season 1936-37 the pack of drysalted herring was restricted to 21,000 tons and was divided by the board among the eighteen drysalted herring plants operating in the province. The output was allocated to the following markets: Kobe, Shanghai and Hongkong. The pack could have been greatly increased had the market been more favourable, as the supply of raw material was large.

Statement No. 8 shows the pack of drysalted herring since 1918.

PILCHARDS

Pilchard fishing, at the request of the operators, commenced in 1936 on June 25 instead of July 1, as heretofore, as quantities of fish were observed off the west coast of Vancouver island by the earlier date.

During the first few weeks of the season fishing operations were quite satisfactory, apart from short periods when boisterous weather interfered.

Temperature indications led operators to expect that there would be a heavy run, but after the first few weeks the fish disappeared and there is reason to believe that larger quantities than usual passed by the west coast of the island and proceeded to inlets in the southern part of District No. 2, where they were caught in considerable quantities in the Rivers inlet and Bella Coola areas during the summer and fall.

The oil content of the fish caught on the west coast of Vancouver island, particularly, was found to be disappointing, and so far as operators in that section of the province were concerned, the season, which had every indication of being a very profitable one, ended with some disappointment.

This year was the first in which pilchards were taken commercially north of Vancouver island, but the supplies found there helped very materially the operations of reduction plants in District No. 2, particularly in the Namu area.

Better prices for meal and oil received by producers helped somewhat to offset the conditions resulting from a smaller pack than expected.

COD LIVERS

Below are shown the landings of cod livers (cod, black cod and ling cod) by Canadian vessels during the period 1933-1936:—

Year	Cwts.	Marketed Value	Average per cwt.
		\$	\$
1933.....	385	7,781	20.21
1934.....	825	16,772	20.33
1935.....	1,127	43,367	38.44
1936.....	1,430	59,654	41.71

WHALES

The number of whales captured, 378, showed an increase of 176 over the total of the previous year, and is the largest number taken since 1929. It will be observed from Statement No. 11 that 82.27 per cent of the whole catch was composed of the valuable Sperm variety.

Two whaling plants were operated in the Queen Charlotte district, one at Naden harbour and the other at Rose harbour and seven whaling steamers were used.

OYSTERS.

The volume of oyster canning in British Columbia continues to increase. The output for 1936 was 3,601 cases, as compared with 1,087 in the previous year and 860 cases in 1934, the latter the first season in which oysters were canned in the province.

The variety used practically altogether in canning is what is known as the Pacific oyster. Owing to the size to which this oyster grows it lends itself readily to canning. No matter what its size it can still be canned when cut up and it is in increasing demand for purposes of soup making.

The quantity of oysters marketed fresh during the year amounted to 2,594 barrels, the largest total since 1931.

All in all, there would seem to be a promising future ahead for the British Columbia oyster industry.

DEPARTMENT OF FISHERIES

The following statement shows the quantities of oysters marketed fresh and canned, respectively, in the past three years:—

Year	Marketed Fresh	Canned
	bbls.	cases
1934.....	2,437	860
1935.....	2,266	1,087
1936.....	2,594	3,601

CLAMS

The year's pack of 12,579 cases of canned clams shows an increase of 2,370 cases over that of 1935. The quantity of clams marketed in a fresh state, however, shows an increase of 5,407 barrels over sales of the preceding year, which, for their part, were the largest for many years. This increase was largely due to the demand from the United States market. Export of fresh clams is permitted provided they are packed in boxes not exceeding 80 pounds, in the shell.

The quantities of clams marketed fresh and canned each year since 1934 have been as follows:—

Year	Marketed Fresh	Canned
	bbls.	cases
1934.....	3,166	5,815
1935.....	7,858	10,209
1936.....	13,265	12,579

FUR SEAL SKINS

Statement No. 12 shows that 1,888 fur seal skins were landed in British Columbia, or 1,047 more than in the year before. The skins were obtained by the Indians off the west coast of Vancouver island, under the privileges accorded them by the Pelagic Sealing Treaty of 1911.

DESTRUCTION OF SEA LIONS

C.G.S. *Givenchy* was again used during the year for the purpose of reducing the number of sea lions in the vicinity of the valuable salmon gillnet areas of Smiths and Rivers inlets. C.G.S. *Malaspina* also did some service of the kind. The following statement sets out the results of the sea lion hunts.

Date	Locality	Adults	Pups
June 7.....	Virgin rocks.....	59	72
June 8.....	Pearl rocks.....	80	2
June 9.....	Virgin rocks.....	35	1
June 10.....	East Haycocks.....	788	254
June 11.....	Pearl rocks.....	29	.....
June 12.....	East Haycocks.....	1,298	623
June 26.....	East Haycocks.....	390	166
June 10.....	Solander rocks.....	60	.....
	Totals.....	2,739	1,118

Rifles and ammunition were kept on board the two vessels so that in connection with their patrol duties along the coast of the province the ships might take advantage of opportunities to destroy sea lions at the several widely scattered points at which these animals are known to congregate in numbers

injurious to the fisheries. It is expected that by this method there will be more effective control of the size of the herds.

BOUNTY ON HAIR SEALS

Below will be found particulars of the number of hair seals on which bounty has been paid by the Fisheries Department since 1914. For the fiscal year of 1936-37 the sum of \$7,500 was available for hair seal bounty in British Columbia, but between April 1 and December 31, 1936, only 1,442 hair seals had been destroyed and the bounty paid totalled \$2,163. The statement follows:—

Fiscal Year	Rate	Number	Amount
	\$		\$
1914-15.....	3 50	2,237	7,829 50
1915-16.....	1 00	749	749 00
1916-17.....	1 00	785	785 00
1917-18.....	1 00	748	748 00
1927-28.....	3 50	567	1,984 50
1928-29.....	3 50	3,209	11,231 50
1929-30.....	2 50	5,944	14,860 00
1930-31.....	2 50	6,308	15,770 00
1931-32.....	2 50	6,084	15,210 00
1932-33.....	2 00	4,300	8,600 00
1933-34.....	1 50	400	600 00
1936-37 (April 1-Dec. 31, 1936).....	1 50	1,442	2,163 00
Totals.....		32,773	80,530 50

FISHERIES DISPUTES

During the year the catches of the salmon fishermen were considerably curtailed by a series of strikes, particularly in the prolific sockeye areas of Rivers inlet, Smits inlet, Bella Coola and Alert bay. In each case the reason given by the fishermen for striking was that the prices offered by the buyers were unsatisfactory.

Between May 25 and June 10 gillnet fishermen operating above New Westminster bridge in the Fraser river refused to fish, as a protest against the price being paid for red spring salmon. The gillnetters below the bridge also kept their nets out of the water between June 1 and 9 in sympathy with the operators above the bridge. Operations were resumed with no increase in price.

On the east coast of Vancouver island, in the blueback areas, some twenty rowboat trollers remained in port during the first day of the open season in the hope, as it was stated, that this action would result in higher prices being received. The other trollers were apparently satisfied with the figures offered and the rowboat owners decided to join in the fishing.

At Rivers inlet 1,802 salmon gillnetters were licensed to operate and fishing operations commenced as usual on July 1. However, when the fishermen found that they were to receive five cents less for each sockeye than was being paid in other salmon gillnet areas of the northern district, they ceased fishing and the majority, after unsuccessful attempts had been made to adjust the differences, left for other areas. In previous years the same amount was paid for sockeye at Rivers inlet as in other districts of the north, but the cannery claimed that owing to the smaller average size of the Rivers inlet fish as compared with catches from other northern gillnet areas and a lower market price for the Rivers inlet product, they could not afford to continue paying the same price in that area as in other districts.

The gillnet fishermen at Smiths inlet, Fitzhugh sound, Fisher channel, and Bella Coola, together with the salmon purse-seiners in the Alert bay and Butedale areas, evidenced their sympathy with the strikers by also refusing to fish.

The purse-seiners at Alert bay remained out from July 5 to July 15, but after that date resumed operations without any increase in price. The seiners in the Butedale area also decided to return to fish after some days' idleness.

ENGINEERING WORK

In Appendix No. 3 of this report will be found reference to the work which engaged the attention of the engineering branch of the British Columbia service.

MINISTER'S VISIT TO BRITISH COLUMBIA

With a view to making a first hand study of the fisheries of this province, Honourable J. E. Michaud, M.P., Minister of Fisheries, spent three weeks at the height of the 1936 fishing season visiting fishing areas along the coast between the international boundary on the south and the Alaskan boundary on the north. Included in points visited were Vancouver, New Westminster, Alert bay, Smiths inlet, Rivers inlet, Skeena river, Prince Rupert, Naas river, Massett inlet, Skidegate inlet, Kyuquot, Uchuelet, Port Alberni and Victoria. Representatives of the various branches of the fishing industry were given an opportunity to present for the consideration of the minister any matters they wished to bring forward and advantage was taken of the opportunity at most of the points mentioned. The minister's inspection also included a survey by seaplane of the Fraser river, Gulf of Georgia, Smiths inlet, Rivers inlet and Owekano lake areas. This was the first occasion on which a federal Minister of Fisheries had made so extended a survey of British Columbia fisheries resources and operations and the industry expressed keen appreciation of Honourable Mr. Michaud's visit and interest.

VIOLATIONS

The statement below gives, by districts, the number of violations of fisheries laws and regulations in 1936, together with the revenue resulting from fines and sales of confiscated articles:—

	District No. 1	District No. 2	District No. 3	Total
Violations.....	75	36	49	160
Fines.....	\$ 1,165 00	1,245 00	859 00	3,269 00
Sales.....	\$ 52 89	346 08	276 78	675 75
Totals, fines and sales.....	\$ 1,217 89	1,591 08	1,135 78	3,944 75

PATROL SERVICE

There were 21 power boats, departmentally owned, 83 chartered power boats and 12 rowboats, together with 2 seaplanes, engaged in the patrol of the fisheries in the province throughout the year.

C.G.S. *Malaspina* logged 24,561 miles during the year and C.G.S. *Givenchy* 13,787 miles.

All the departmentally owned boats were overhauled in the course of the year, the work being done largely at the repair stations maintained on the Fraser river and at Digby island, near Prince Rupert. Most of the necessary work is performed each year by the members of the crews of the patrol boats, some of whom are retained during the winter months for this purpose only. In this way, in addition to having the boats repaired economically and satisfactorily, certain key men of the patrol system are given all-the-year-round employment and are available each season, instead of inexperienced men being brought in every year.

The two fisheries protective vessels are inspected at the end of the year by the federal steamboat inspection staff and tenders for repairs are invited from those in the province in a position to do the work. Such tenders are on specifications prepared by the steamboat inspectors and the work is performed under the inspectors' supervision.

Seaplane patrol in 1936 covered 253 hours, as shown hereunder:—

Base	Hours	Minutes
Alert Bay.....	74	00
Nanaimo.....	28	30
Swanson bay.....	150	30
Total.....	253	00

SUMMARY OF AIR PATROL SERVICE

Year	Hours	Minutes	Year	Hours	Minutes
1927.....	92	02	1932.....	275	25
1928.....	261	30	1933.....	260	25
1929.....	408	08	1934.....	262	10
1930.....	443	40	1935.....	302	50
1931.....	319	25	1936.....	253	00

DEPARTMENTAL STAFF

The number of employees in the federal fisheries service in the province varies from year to year, according to the intensity of fishing and the variation in the amount of work in connection with the clearing of streams and the building of fishways. In 1936 a considerable reduction in staff came about in the hatchery service as a result of the closing of all the salmon hatcheries in the province, following the recent recommendation by the Biological Board.

Below is given a statement showing particulars of those employed during the year in the several branches of the service:—

Supervisors, inspectors and clerical staff.....	55
Guardians.....	37
Patrol and protection services.....	206
Fish Culture.....	68
General—removal of obstructions, spawning ground inspections, etc.....	61
Total.....	427

RETIREMENTS IN THE SERVICE

There were nineteen retirements in the service during the year under review. Practically all of them resulted from the closing of the salmon hatcheries. The list of these retirements follows:—

Name	Rank	Years of Service
John Kerr Raphael.....	Principal Clerk.....	20
John William Allen.....	Master Mechanic.....	17
Charles William Harrison.....	District Supervisor of Fish Culture.....	26
David Bothwell.....	Hatchery Superintendent.....	31
Charles Raven.....	Hatchery Assistant.....	15
Henry Gordon Corder.....	Hatchery Assistant.....	11
Weldon Roccliffe Reid.....	Hatchery Assistant.....	22
Bernard Herbert Symms.....	Hatchery Assistant.....	15
Edol Alexander McRae.....	Hatchery Assistant.....	11
William Laurence Goodlet.....	Hatchery Assistant.....	15
Thomas William Graham.....	Hatchery Superintendent.....	32
John Wilson Dalzell.....	Hatchery Assistant.....	16
Edgar Vivian Epps.....	Hatchery Assistant.....	19
Roy Herbert Eaton.....	Hatchery Superintendent.....	16
Stanley Johnstone.....	Hatchery Assistant.....	16
Charles Robert Thornley Hearn.....	Hatchery Superintendent.....	16
William Henry Billington.....	Hatchery Assistant.....	11
John McPhail.....	Hatchery Assistant.....	16
Sydney Ernest Carreck.....	Hatchery Assistant.....	17

DEPARTMENT OF FISHERIES

SPORT FISH

For years past the department has carried on propagation of sport fish, in conjunction with its other fish cultural work in British Columbia so that depleted streams and lakes might be re-stocked and game species introduced into suitable waters that were barren of them. These operations have been very successful.

Since 1933 the Provincial Game Commission has also been obtaining sport fish eggs, largely through the federal department and hatching them at establishments maintained at Stanley park, Vancouver, Veitch creek and Qualicum, Vancouver island.

It has been felt that notwithstanding the satisfactory results which have been obtained from operations as conducted, the duplication has been undesirable, both from the standpoint of economy and results.

The revenue to the department is confined to the sale of a limited number of non-resident angling permits, whereas the revenue received by the provincial authorities is derived from a licence fee provided under the Provincial Game Commission's regulations and amounts to a very considerable sum annually.

The whole situation from the standpoint of administration, economy, and results has been thought unsatisfactory and with a view to obtaining full information for the purposes of both Governments, a committee composed of Major J. A. Motherwell, Chief Supervisor of Fisheries, Inspector F. R. Butler of the Provincial Game Commission and Dr. W. A. Clemens of the Biological Board staff was created in December, 1936, for the purpose of gathering factual data pertaining to the sport fisheries of the province. The committee was to report as to "what is being done at the present time by the respective authorities in the interests of the sport fisheries, the cost thereof, also the direct revenues derived therefrom by each" and "dividing the province into areas for the purpose of dealing therewith" to report as to what are the sport fish conditions prevailing in each of the several areas and how do they compare with former years" and "whether there is need therein for the assistance of fish culture or otherwise; and if so, in what manner and to what extent and what cost would be necessary to meet any such assistance."

To assist in obtaining a comprehensive picture of the situation all angling associations in the province, fishery officers and game wardens were circularized and they were asked to report upon conditions in their respective areas as compared with those previously obtaining.

The report of the committee will be prepared and forwarded to the respective Governments early in the new year.

COARSE FISH DESTRUCTION

In connection with the improvement of sport fishing conditions in the interior of the province, an effort has been made to reduce the numbers of coarse fish in several of the lakes, in order to give the sport fish species an opportunity to increase. The numbers so destroyed in 1936 were as follows:—

Okanagan District	Squawfish	Carp	Suckers	Total
Okanagan lake.....	45	495	.....	540
Duck Lake.....	600	400	1,000	2,000
Long lake.....	.....	32	1,954	1,986
Oyama lake.....	93	75	72	240
Blue lake.....	849	.....	1,101	1,950
Totals.....	1,587	1,002	4,127	6,716

SPORT FISH PROPAGATION

The 1936 collections and distributions in the province of the several varieties of sport fish eggs and fry from departmental hatcheries were as follows:—

Species	Collections	Distributions	
		Eggs	Fry
Kamloops trout.....	8,951,882	4,150,061	3,780,276
Steelhead trout.....	589,252	160,680	355,882
Cutthroat trout.....	37,824	553,070	120,623
Eastern brook trout.....		60,000	184,876
Kokanee.....	1,582,000	425,000	561,501
	11,160,958	5,348,811	5,003,158

REPORT ON SPAWNING GROUNDS, 1936

Generally speaking, the year 1936 has been an unusually favourable one from the standpoint of conditions found on the spawning beds of the salmon. Of course, there have been exceptions where conditions have not been all that might be expected, but in the areas frequented by the valuable sockeye species, for instance, the catch for the year under review has been the largest since 1930, yet notwithstanding this fact the quantities found on the spawning grounds were found to be highly satisfactory.

Efforts of the department with a view to assuring the escapement of a reasonable percentage of the several runs by means of closed times and the moving of boundaries further down the main rivers and farther out from the mouths of smaller streams are undoubtedly producing the results desired and there need be little fear of the salmon supply of the province being seriously depleted as long as it is possible to maintain the machinery at present in force for the purpose of enforcement of regulations.

A more detailed description of conditions is given as follows:—

Queen Charlotte Islands

There is no commercial fishing of sockeye in these waters, but the supply which reaches the two or three small streams, and is used largely by local residents for their own food purposes, is being maintained.

Cohoos do not use the streams in this area to any large extent, but the 1936 escapement was normal.

The pink is the species which utilizes spawning areas in the Queen Charlottes to the greatest extent and in the year under review the escapement was found to be excellent, generally speaking, apart from an odd stream. The Yakoun river, which is the one which produces the largest number of pinks, was found by the inspecting officer to be crowded with the fish. The number found was considerably in excess of what might be expected from the pack. The quantity caught, of course, is largely dependent on tidal and weather conditions.

The chum supply on the spawning grounds was found to be heavier than usual. There is no doubt that the precautions taken during recent years by the department are restoring the runs of this variety to their original state.

Naas River

The numbers of sockeye reaching the spawning grounds of the Meziaden Lake district are reported as being larger than in the past fifteen or twenty years. There was also a heavy escapement to that portion of the Naas watershed lying

above Meziaden lake. This year's escapement would appear to be additional evidence that the lowering of the boundary in the Naas river by six miles was a most efficient method of conservation.

The spring supply was heavier than for several years past and can be considered as quite satisfactory.

The number of cohoes found was considerably greater than that of four years ago and the escapement is reported as being heavy.

Pinks also reached the spawning grounds in large quantities and the escapement is reported to be considerably greater than that of the brood year of 1934, both in the Naas river proper and the streams tributary to Portland and adjoining inlets.

The chum supply on the spawning grounds was also found to be large, both in the spawning grounds of the Naas and the streams draining into the salt water. The escapement was greater than in recent years.

Skeena River

At Lakelse lake there was a heavy escapement, which was estimated to be considerably greater than that of the brood year of 1932. The fact that the hatchery was not operating during the season would, of course, permit to pass to the spawning grounds a number of fish that would otherwise have been taken in the fish cultural operations. Even so, the escapement was very good.

In the Kitsumgalum area the supply was also good, better than that of the cycle year.

In the Babine lake and river areas the sockeye escapement was reported as being fairly heavy and very similar to the spawning of 1931 and 1932. The inspecting officer reports in part as follows: "I would consider that this has been a very favourable year with plenty of fish that spawned freely under very favourable conditions, with lots of water covering the areas and going into the fall well covered. I am of the opinion that this has been the best year, in respect to natural conditions, that I have seen in the area; areas covered with plenty of water during and after the spawning, and practically no frosts; while there were freshets, no extremes; on the whole large fish, and the sexes fairly even."

Quite a satisfactory supply of springs and cohoes were also found on the spawning grounds and a particularly large number of the former in the Oestahl river. The quantities of cohoes were found to be much larger than for several years. The season was an "off" year for pinks to the upper portions of the Skeena, but heavy escapement took place all over the lower reaches of the Skeena watershed and the escapement of this variety in general was superior to that of the preceding cycle year.

The supply of chums was better than usual and it is reported as a heavy run for the area, although large quantities do not use the Skeena River spawning grounds.

The upper fishing boundary of the Skeena river in the year under review was lowered to a line between Lambert point and Mowitch point in order to secure the escapement of a larger percentage of the runs of the several varieties. This action appears to have obtained the results desired, judging from the reports from the spawning areas.

Lowe Inlet

The sockeye streams and lakes in this area are quite near the coast and the streams are affected more than the larger ones by the rainfalls, or lack of them. During the season conditions were good from the standpoint of water and the escapement of sockeye was reported as heavy, with the exception of the streams on the west coast of Banks island. Precautions will be taken in the cycle year, however, to see that a reasonable percentage of the return of fish pass unmolested to the spawning grounds.

The supply of pinks was found to be quite satisfactory and there was a heavy escapement, reported to be much greater than 1934, the brood year, and similar to the big escapement of 1930. It will be remembered that in this area special precautions have been taken in recent years to assure protection for the pink salmon in view of the intensive fishing which has prevailed for some time.

The chum supply is also reported as heavy and similar to that of four years ago.

Butedale Area

The Butedale area is not a prolific sockeye area, but the escapement was similar to that of the brood year.

The escapement of cohoes was better than usual, a condition that was no doubt due to the closing of fishing unusually early.

In the case of pinks, all the streams in the Douglas channel area were heavily seeded. The supply in the southern portion of the area, however, was not so great, but due to the fishing operations being concentrated largely in the northern portion the percentage of escapement was greater and the conditions are reasonably satisfactory. The escapement generally all over the area is reported as showing a decided increase over that of the brood year.

In the case of chums, the fishing intensity was considerably less as a result of lack of demand by the canners. A large percentage of the runs escaped to the spawning grounds and the supply found was large, although possibly not equal to the unusually large escapement in the year 1932.

Bella Bella Area

The sockeye supply on the spawning grounds is reported as being heavier and greater than that of the brood year. Fortunately the streams were high during the run and the salmon were able to pass directly to the spawning grounds instead of waiting around the mouths of the streams as always happens in dry seasons.

The coho supply in this area as well was reasonably good, as fishing was closed earlier than usual and the streams were high when these fish arrived.

In the case of pinks, the fishing effort was greatly curtailed as supplies were more plentiful in other areas. This permitted a large percentage of the run to pass safely to the spawning grounds. The main pink streams were well seeded and the small streams fairly so.

The bulk of the chum run arrived after the closing date of September 25 and passed unmolested to the spawning grounds. The main spawning areas were well seeded.

Bella Coola Area

The escapement of sockeye as compared with that of the brood year, 1932, was heavy. Undoubtedly the strike of the gillnet fishermen had a good deal to do with the satisfactory escapement.

Supplies of springs were found to be fair, but there has never been a large run of this species to this area.

The coho escapement is reported as quite heavy. The pink supply was only fair and not equal to that of the brood year, 1934.

Large quantities of chums were found on the spawning grounds. Unfortunately since the spawning of the salmon there have been unusually severe freshets in the Bella Coola area, resulting in the destruction of large quantities of eggs. Precautions will be taken to see that in the cycle year provision is made for the escapement of a reasonable percentage of the runs.

Rivers Inlet Area

The supply of sockeye in this important gillnet area has been maintained well during recent years. This season, due to a strike amongst the gillnet fishermen, the bulk of the sockeye were enabled to pass unmolested to the spawning grounds and the resultant spawning, as might be expected, was heavy.

A disquieting factor, however, has been a freshet, the severity of which has not been equalled for many years. Undoubtedly quite a percentage of the eggs deposited in the gravel has been destroyed and this may nullify to some extent the excellent results which might otherwise have been expected four and five years hence.

In this area also the escapement of cohoes was better than usual, owing to the early closing of fishing, although the supply found on the spawning grounds was not as great as might be desired.

Pinks and chums do not frequent the Rivers Inlet area in large quantities, but the numbers found on the spawning grounds would justify the conclusion that the runs are being maintained.

Smiths Inlet Area

The same conditions in this area, from the standpoint of striking fishermen, obtained as in the case of the Rivers Inlet area and a greater percentage of the sockeye were permitted to pass safely to the spawning grounds where large quantities were observed spawning under favourable conditions.

There was a larger number of spring observed than usual, although the quantity of springs frequenting the area does not justify at the present time intensive fishing.

The coho supply has never been a very important one here, but the run appears to be maintaining itself.

The pink supply, although never heavy, was not quite as good in 1936 as usual.

Chums do not appear in large quantities in the inlet, apart from the Takoosh river. The escapement for this season was quite a heavy one, at that point, and is undoubtedly the result of the closure of fishing which has been in effect for four years.

Fraser River Watershed

The escapement of sockeye to the Fraser River spawning areas was much larger than expected. It is difficult to explain the situation with positiveness as the indications on the spawning grounds in the brood year of 1932 did not justify the expectation of so large a seeding. The quality of a very large percentage of this run was unusually high and compared very favourably with that of the former big fourth-year run. This being the case, it was suggested that possibly these salmon were heading for the upper reaches of the watershed, which was the area to which the big fourth-year run ascended for spawning purposes. The usual examinations of the spawning grounds, however, showed no appreciable increase over recent seasons in the quantities at Quesnel, Horsefly, Bowron Lake, Stuart Lake, and Francois Lake districts. Nevertheless, there was a considerably larger supply than expected in the spawning areas of the Pemberton and Pitt Lake districts and an unexpectedly large return to the Seton-Anderson Lake system, whilst in the Chilco Lake area, where four years ago some 70,000 sockeye had been estimated, there was this year found at least an equal supply, and probably more.

Water conditions at Hells gate were unusually favourable all through the summer and salmon found the ascent past this point easier than usual.

Each year there has been a run of sockeye by way of Johnstone straits, which are between Vancouver Island and the mainland, in addition to the bulk of the run by way of Juan de Fuca straits and Puget Sound waters. Undoubtedly, the number using the first mentioned route in 1936 was somewhat greater than usual and must have been responsible for a considerable portion of the unexpected supply reaching the Fraser spawning grounds. On the other hand, it is possible that conditions prevailing in Puget Sound fishing had the effect of

permitting a larger percentage of the run passing through Puget Sound waters to reach the Fraser river.

Spring salmon were found in numbers greater than during recent years on the spawning grounds of the Fraser, and this was also true as to the quantity of chums in all the spawning grounds in District No. 1 frequented by this species.

Coho supply, generally speaking, was not found to be satisfactory, but indications were that due to the unusually low water in the streams frequented by these salmon they had not passed up to the usual spawning grounds. Salmon fishing was therefore closed in the Fraser district until the rains provided sufficient water to fill the streams. There are coho on the spawning grounds of the Fraser River watershed as late as February and March in each year.

The year 1936 was the "off" year for the pink run and none were found.

In more detail, conditions found during 1936 were as follows:—

Prince George Area.—In the Stuart Lake district extremely few sockeye were found. The supply reaching the Fraser-Francois Lake watershed was less than expected and about six weeks later in arriving than in recent years. The fish were observed during the last week in September.

Quesnel Area.—In the Bowron Lake area indications were that more sockeye were present than in recent years, although not more than 1,000 were seen. In the Quesnel Lake area also the supply was a disappointment, but conditions found in the brood year had not been encouraging. It is estimated that 70,000 spawning sockeye were observed on the beds in Chilco lake. This was the main run, but a later run passed up the Chilco river in October. It was estimated at possibly 4,000 fish. The first were in good physical condition, but the second were very weak.

The supply of springs in the Quesnel area, generally speaking, showed considerable improvement over that of recent years.

Kamloops Area.—Although sockeye ascend the North Thompson river, this stream is not considered one of the very important spawning areas. The supply this year was reasonably satisfactory, in fact at Raft river those living in the district say that there were more sockeye observed this year than for the past twelve seasons. The Clearwater river was inspected more thoroughly this year than before in order to ascertain whether it is used by sockeye but none of these fish were observed.

The South Thompson system, as in the past, contained larger quantities of sockeye than the North branch. Favourable conditions make it possible to estimate pretty accurately the quantity of salmon seen. At Adams river the number of spawning sockeye seen was estimated at 4,000 as compared with 2,000 in the cycle year of 1932. The fish made their first appearance on October 18th in a fairly advanced stage towards spawning.

At Little river it is estimated some 2,000 sockeye were observed. In this district also the supply of springs found on the spawning grounds was quite satisfactory as compared with the number in recent years. Cohoes were reasonably abundant but the run of this species extends over several months in the fall and at the time of inspection it was not possible to obtain the complete picture.

Hope Area.—Sockeye were first observed in the vicinity of Yale on July 10th and from that date on the run steadily increased with the local officer reporting a heavy escapement through Hells gate and past the rapids in the Fraser river at the confluence with Bridge river.

Apparently there was no difficulty in passing through Hells gate as the water conditions during the whole run were unusually favourable. The local officer, who has been observing the conditions for the past twenty years, is

satisfied that the sockeye run ascending to points above Hells gate was heavier than for any previous year since 1913.

An unusual feature in this sub-area was the unexpectedly large quantity of sockeye reaching the Seton-Anderson Lake system. For many years past there have been observed no more than two or three hundred individual spawners, but during the season just past the number found was estimated at approximately 12,000 fish. This is the greatest number found in the past twenty years. They commenced to arrive in the middle of August and the run continued until about the third week in October. Spawning took place in Gates creek, Portage creek and Seton creek. Some small schools were observed on the lake shore at the mouth of some very small streams.

The spring salmon spawning in this sub-area was also heavier than usual.

Pemberton-Birkenhead Area.—Although a good seeding was expected, the supply of sockeye found this year was considerably larger than usual and it was estimated by those observing to be the largest in the past twenty years. The fish individually were large.

The Harrison Lake portion of the area, which includes Morris creek, Silver creek, and Harrison river, showed quite a good supply of sockeye in comparison with the runs of recent years.

Cohoos in satisfactory quantities were also observed, although the supply of spring salmon was only fair.

The supply of chums in Harrison lake and river was found to be unusually heavy.

Cultus Lake.—The return of sockeye to Cultus lake was larger than expected and considered quite satisfactory. The normal supply passed up the Chilliwack river to the lake of that name.

The chum run to this area was quite good and cohoes were found to be abundant.

Chilliwack-Pitt Lake Area.—In the Pitt river the run of sockeye was reported to be larger than expected and the individual fish were big. There is no doubt but that the Pitt system received a heavy seeding.

Coastal Streams.—In the Serpentine and Nicomekl rivers, draining into Boundary bay, cohoes were found to be more plentiful than usual.

In the Howe Sound area a very large supply of chum salmon arrived, in fact it is reported as the heaviest for twelve years.

These conditions also existed in a lesser degree, in Indian river at the head of Burrard inlet.

Alert Bay Area.—The quantity of sockeye found on the spawning grounds of the Nimpkish River system was much greater than for many years, owing to comparatively light fishing as a result of a strike amongst the salmon purse-seine fishermen. The inspecting officer reports the spawning grounds as being crowded with sockeye, with large numbers still showing in the various lakes. In Fullmore river, Port Neville, the supply was greater than in any year since 1928. Spawning at McKenzie, Nahwitti, Shushartie and Keough rivers was normal, but in the Kakweiken river there was some falling off as compared with the brood year.

The beds frequented by springs can be considered as being fairly well supplied.

Coho supply was satisfactory in all the streams usually frequented by these fish.

In the case of pinks the run was estimated as being about 20 per cent greater than that of the brood year, generally speaking, although the seeding was not so heavy at Wakeman and Kingcome rivers.

Chum seeding, generally, was heavier than for many years, the inspecting officer estimating an increase of 25 per cent over the heavy run of the brood year of 1932. The supply to the Nimpkish area is reported as being the largest in twenty years.

Quathiaski Area.—Sockeye in the Quathiaski area spawn at Hayden Bay lake and in the stream entering the head of Phillips arm. In the former area the supply was much heavier than in the brood year, 1932, but in Phillips arm the quantities were not so great as in that year. Owing to lack of intensive fishing, however, the seeding was satisfactory.

Good runs of springs occurred at Campbell river and Phillips arm, and the spawning grounds generally throughout the area were better seeded than during the previous season.

The coho supply was not what could be desired, except at Bute inlet where there was a good spawning. In the remainder of the area the conditions were not so satisfactory.

As a result of the heavy freshets of the winter of 1934-35 and the consequent scouring of the spawning beds, the return of pinks this season was considerably smaller than usual but the escapement was large and under the circumstances there was a reasonably good seeding.

The chum run was reported to be heavier than for four years. Fishing was not intensive and the spawning areas have been better seeded than for many years.

Pender Harbour Area.—Saginaw creek is the only sockeye stream of any importance in this area and a normal supply of fish was found on the spawning beds, as well as at several other minor streams.

The run of coho was fairly light but a good proportion escaped to the spawning beds.

The pink run was lighter than in the brood year, as a result of the scouring of the spawning beds in the winter of 1934-35. The return was estimated at only about 75 per cent of the run two years previously, but as there was practically no fishing of pinks the escapement was quite satisfactory.

All streams throughout the area were plentifully seeded with chums.

Comox Area.—The Puntledge river received a larger supply of springs than for some years past. Spawning was satisfactory in the usual area below the impounding dam, but considerable numbers spawned in the lower portion of the river. This was due to low water conditions.

The coho supply was normal in all the streams of the area, although late in ascending because of low water.

The Oyster, Puntledge, and Tsolum rivers which are the main pink streams in the area, received only from five to ten per cent of the usual supply of pinks. The only exception was in the case of Tsable river. This condition was the result of the heavy floods of 1934.

Chum spawning at all streams was heavier than for many years.

Nanaimo Area.—The seeding of springs was greater than for several years.

Cohoos were not as numerous as four years previously but, as a result of low water, they were late in arriving, and at the time of inspection were still passing up the streams in goodly numbers. Extra precautions were taken, particularly opposite the Qualicum rivers, by means of the two-mile boundary, to ensure a proper escapement.

The pink seeding, although light, was better than for several years.

The chum run to Nanaimo river was much better than that of the brood year and this condition was fairly general, although low water conditions interfered somewhat with the ascent of the fish.

Ladysmith Area.—Springs spawned in greater numbers in Chemainus river than for several seasons. The river is the main stream in the area.

An average supply of cohoes was found in the Chemainus river and satisfactory quantities appeared in Bonsall and other smaller streams.

There is only a light run of pinks to the Chemainus river at any time, but the supply found on the spawning grounds showed an improvement over that of recent years.

The chum seeding in the Chemainus was much heavier than that of the past four years. The smaller streams also received reasonable supplies although some of the early run, due to low water conditions, were not able to pass up the small streams.

Cowichan Area.—The early run of springs occurs during the months of May and June but as has been the case in recent years the run was found to be light in 1936, although the fish succeeded in passing up the Cowichan river before the water receded. The main run during August and September was of good average size. This run was later than usual but on the arrival of delayed rains the salmon were able to go up to the spawning grounds. The supply on the beds, however, is not considered entirely satisfactory.

A medium early run of cohoes had difficulty in passing up the river but eventually succeeded. A good late run, however, was passing safely to the spawning grounds at the time of inspection.

Chums appeared in larger quantities than for several years and the seeding has been satisfactory.

Victoria Area.—This is chiefly a coho and chum area and the supply of both these varieties was normal.

Alberni Area.—The sockeye supply on the spawning grounds shows an improvement over all years within the knowledge of the local officers. Notwithstanding the record commercial catch, the escapement to Sproat and Great Central Lake areas was the heaviest in experience, and that to the Anderson Lake system was better than the escapement of the brood year. This is undoubtedly the result of rehabilitation measures taken by the department.

Spring salmon are reported to have appeared on the spawning grounds in much greater numbers than for several years, the Somass river and tributaries, and the Sarita river receiving particularly large supplies.

The coho streams received supplies comparable with those of the brood year and the spawning was reasonably satisfactory.

The chum seeding was heavier than for several years, particularly in the Nitinat district.

Clayoquot Area.—The seeding of sockeye exceeded that of the brood year and can be considered as satisfactory.

Springs were not so plentiful as during the past two years but there was a reasonably good seeding.

Cohoese were quite plentiful and the spawning beds were well seeded.

This area is not frequented by any considerable number of pinks but the normal supply was observed.

The supply of chums was the heaviest seen for a number of years.

Nootka Area.—Sockeyes and springs were found in normal quantities in the streams. As a matter of fact, this was the case also as regards cohoes and pinks. All the streams were heavily seeded with chums and the numbers appearing were even greater than in the brood year, which in turn showed larger numbers than the several preceding seasons.

Kyuquot Area.—Sockeyes and springs were found in normal numbers in this area but the coho seeding was a fair average only, compared with that of recent seasons.

The run of pinks to this system is always light but the number observed during the year under review was probably double that of normal seasons.

Quatsino Area.—Sockeye do not run in large numbers to this district and the Mahatta river is the stream containing the only supply of any particular value. The numbers appearing this year showed an increase over the runs of recent years.

The supply of springs reaching Marble creek was lighter than for several seasons. The cohoes, on the other hand, were in average abundance over the whole area, with an increase in the Rupert Arm and Marble Creek portions.

Pinks were found to be considerably more numerous in some streams than others, and in comparison with the brood year the run was very fair.

The chum supply was very heavy and there was a satisfactory spawning.

ANNUAL CANNED SALMON PRODUCTION IN BRITISH COLUMBIA

STATEMENT No. 1

Year	Num- ber of can- neries oper- ated	Number of salmon licences issued					Pack canned										Totals	
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue- back	Steel- head	Coho	Pink	Chum			
1925.....	65	4,225	1,821	329	37	19	392,643	39,142	4,419	29,938	10,675	1,996	188,505	445,400	607,904	1,720,622		
1926.....	76	4,750	2,416	445	41	6	336,995	41,276	4,177	23,736	19,445	2,165	162,449	772,993	701,962	2,065,198		
1927.....	76	5,637	3,093	555	46	7	308,032	34,029	8,819	16,129	20,820	1,746	161,148	247,617	562,109	1,360,449		
1928.....	62	5,179	2,987	399	22	7	203,541	11,002	2,328	5,526	6,073	865	150,684	792,362	863,256	2,035,637		
1929.....	63	5,609	2,630	371	24	7	281,306	8,295	3,156	7,926	22,246	672	174,198	477,969	424,982	1,400,750		
1930.....	59	6,061	3,115	343	21	7	477,678	20,184	6,650	11,970	42,033	1,656	148,561	1,111,937	401,114	2,221,783		
1931.....	35	4,893	3,115	228	21	7	291,464	17,526	4,727	4,894	25,296	1,326	76,879	206,995	55,997	685,104		
1932.....	44	5,359	3,033	157	30	7	284,355	46,953	14,133	14,974	28,505	1,168	160,466	223,716	306,761	1,081,031		
1933.....	49	6,113	2,880	238	31	8	258,107	12,464	1,849	5,953	21,763	1,459	137,289	532,558	293,630	1,265,072		
1934.....	49	6,826	3,099	296	9	8	377,882	15,281	1,644	12,859	29,556	1,282	195,874	435,364	513,184	1,582,926		
1935.....	43	6,216	3,107	293	9	8	350,444	10,187	3,114	8,619	15,319	596	216,173	514,966	409,604	1,529,022		
1936.....	46	6,620	3,511	287	9	7	415,024	16,493	2,527	10,834	33,718	1,068	212,343	591,532	597,487	1,881,026		

Note.—Licences issued include transfers from one district to another, except in the case of purse seines after 1929.

STATEMENT No. 2

PACK OF CANNED SALMON ON THE NAAS RIVER—1925 TO 1936

Year	Number of salmon licences issued					Pack canned										Totals
	Num-ber of can-neries oper-ated	Number of salmon licences issued				Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum		
		G.N. Troll	P.S.	D.S.	T.N.										cases	
*1925	3	210				20,351	5,441	387	538		470	8,188	35,880	23,497	94,752	
†1925						18,945	4,067	387	392		457	7,726	34,530	22,504	89,008	
*1926	4	316				15,829	4,616	751	597		375	4,274	43,891	15,392	85,825	
†1926						15,929	4,616	751	597		375	4,274	50,815	15,392	92,749	
*1927	4	302				11,986	3,221	511	213		96	3,845	16,609	3,307	39,788	
†1927						11,986	3,221	511	213		96	3,845	16,609	3,307	39,788	
*1928	3	263				5,558	1,471	68	615		36	18,002	95,998	4,591	126,339	
†1928						5,540	1,471	68	307		36	10,734	83,183	3,538	104,877	
*1929	3	240				16,347	256	57	96			1,195	10,507	1,261	29,719	
†1929						16,077	256	57	96			1,145	10,342	1,212	29,185	
*1930	3	282				26,500	1,772	283	176		137	5,555	90,163	4,330	128,916	
†1930						26,405	1,722	283	176		84	961	79,976	3,853	113,460	
*1931	1	235				16,929	1,010	323	106			8,943	5,178	660	33,149	
†1931						9,146	1,010	323	106			443	3,575	392	14,995	
*1932	3	278				15,138	5,848	264	468		23	33,495	51,920	15,070	122,226	
†1932						14,154	3,676	264	468		10	7,955	44,629	14,515	85,671	
*1933	3	297				10,173	1,014	227	214		114	19,016	57,406	2,778	90,942	
†1933						9,757	885	227	184		49	3,251	44,306	1,775	60,434	
*1934	3	335				36,242	533	126	145		311	26,698	37,698	5,558	107,311	
†1934						28,701	383	126	145		311	9,935	32,965	2,648	75,214	
*1935	3	310				12,712	94	298	168		143	21,810	25,508	17,481	78,214	
†1935						12,945	86	298	168		143	5,125	21,443	12,681	52,189	
*1936	3	349				28,562	1,622	229	316		496	11,842	72,022	20,196	135,285	
†1936						24,137	520	188	237		496	8,439	60,582	16,504	111,103	

* Pack of fish caught at Naas river regardless where canned.

† Pack of Naas river regardless where caught.

NOTE.—Licences issued, except 1925, include transfers from other districts.

DEPARTMENT OF FISHERIES

PACK OF CANNED SALMON ON THE SKEENA RIVER—1925 TO 1936

STATEMENT No. 3

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Pack canned										Totals
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum		
																cases	
†1925.....	13	1,067					77,785	17,811	1,657	2,457		700	38,029	127,226	10,687	276,352	
†1925.....							81,149	19,185	1,657	2,603		713	39,168	130,083	74,308	348,866	
†1926.....	15	1,129					82,307	17,896	966	1,750		764	30,153	170,586	46,382	350,804	
†1926.....							82,357	17,896	966	1,750		764	30,209	210,064	63,527	407,533	
†1927.....	13	1,195					83,988	13,595	3,567	1,609		646	25,209	38,903	9,656	177,173	
†1927.....							83,984	14,856	3,567	1,609		580	25,623	38,761	18,659	187,639	
†1928.....	11	1,208					34,524	4,121	988	397		231	18,751	191,812	11,792	262,616	
†1928.....							34,559	5,043	988	354		241	30,194	209,579	17,751	298,709	
†1929.....	11	1,143					77,714	3,795	441	383		13	37,138	94,846	3,625	217,955	
†1929.....							78,014	3,795	441	383		13	37,456	95,305	4,835	220,242	
†1930.....	11	1,202					130,952	6,589	1,047	322		60	24,191	214,266	3,327	380,754	
†1930.....							132,372	6,674	1,047	324		58	29,203	275,642	5,057	450,377	
†1931.....	8	1,076					107,936	7,040	2,284	534		768	20,146	41,264	3,893	183,865	
†1931.....							93,029	7,040	2,284	534		768	10,737	44,807	3,610	162,809	
†1932.....	10	1,119					59,916	16,378	9,419	2,472		404	48,312	58,261	38,549	233,711	
†1932.....							52,624	14,268	9,419	2,472		365	20,549	32,519	28,756	160,972	
†1933.....	10	1,218					30,506	2,626	444	227		267	39,896	95,783	15,714	185,463	
†1933.....							27,693	6,805	444	828		201	21,366	79,932	10,970	148,239	
†1934.....	9	1,164					70,654	6,844	592	860		114	54,470	125,163	24,388	283,085	
†1934.....							54,558	6,809	592	860		131	21,298	27,628	6,242	118,118	
†1935.....	9	1,053					64,140	3,443	429	188		12	45,512	99,412	31,807	244,943	
†1935.....							52,879	3,422	429	188		14	23,498	81,868	8,122	170,420	
†1936.....	8	970					97,823	4,883	455	435		33	55,198	178,299	36,892	374,018	
†1936.....							81,960	3,781	414	356		33	32,142	92,997	15,343	227,026	

† Pack of fish caught at Skeena river regardless where canned.

‡ Pack at Skeena river regardless where caught.

NOTE.—Licences issued include transfers from other districts.

STATEMENT No. 4

PACK OF CANNED SALMON FROM FISH CAUGHT AT RIVERS INLET AND SMITHS INLET—1925 TO 1936

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Pack canned								Totals			
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring		Pink Spring		White Spring	Blue-back	Steel-head		Coho	Pink	Chum
								cases	cases	cases	cases							
1925	11	1,127					201,186	344	311	116				10	4,887	7,675	11,501	226,030
1925							170,581	215	311	57					4,866	8,625	11,477	196,132
1926	12	1,483					89,866	535	249	160				27	10,348	8,493	14,690	124,368
1926							74,629	473	189	142				11	7,448	13,503	11,751	108,146
1927	13	1,842					101,053	463	530	321				19	5,475	1,383	5,027	114,271
1927							87,145	322	530					17	4,980	1,402	3,617	98,334
1928	11	1,541					93,361	458	443	157				13	9,761	3,130	9,200	116,523
1928							88,875	156	443	152				13	1,098	16,703	3,626	111,066
1929	13	1,577					79,548	546	215	127				47	8,270	3,112	6,536	98,401
1929							77,669	140	239	107				41	3,239	1,340	1,091	83,866
1930	12	1,833					150,398	614	383	229				182	6,760	17,476	18,372	194,414
1930							141,634	275	383	215				208	2,084	34,638	2,135	181,622
1931	5	1,433					92,872	218	61	183				69	5,536	2,296	544	101,779
1931							80,732	200	82	165				68	6,683	3,724	562	92,216
1932	10	1,754					86,110	405	236	145				56	11,871	4,305	5,516	108,644
1932							85,358	128	236	143				49	7,335	4,631	1,109	98,989
1933	11	1,962					119,548	606	108	243				153	9,078	11,658	8,932	150,326
1933							114,045	454	108	241				169	8,514	25,054	9,518	158,103
1934	11	2,318					89,575	532	82	129				121	11,862	2,928	14,375	119,604
1934							82,828	390	82	128				122	8,793	9,769	16,444	118,566
1935	8	2,023					166,686	138	352	155				63	9,576	8,966	19,563	205,499
1935							129,531	94	306	146				49	7,128	6,045	7,128	144,216
1936	8	2,210					59,138	317	132	162				60	7,432	6,497	13,158	86,896
1936							42,803	315	131	148				54	7,683	17,254	10,921	79,309
1936																		

NOTE.—Figures shown in roman are packs from fish caught at Rivers inlet or Smiths inlet. Figures shown in italics are actual packs irrespective of where fish taken and not including fish shipped out for canning in other districts. Licences issued include transfers from other districts.

PACK OF CANNED SALMON IN THE FRASER RIVER DISTRICT—1925 TO 1936

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued				Pack canned										Totals
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	
							cases	cases	cases	cases	cases	cases	cases	cases	cases	cases
1925.....	10	969	50	.....	.....	.....	31,523	7,335	873	25,482	5,107	45	36,717	99,800	66,111	272,993
1926.....	10	1,063	59	.....	.....	.....	83,589	11,774	1,030	20,130	14,036	39	21,787	32,256	88,493	273,134
1927.....	10	1,249	111	.....	.....	.....	57,085	6,553	1,351	10,493	10,621	37	24,079	102,535	67,259	280,013
1928.....	8	1,303	109	.....	.....	.....	26,530	1,173	248	3,661	795	.....	27,061	2,881	193,106	255,455
1929.....	9	1,473	113	.....	.....	.....	60,407	2,984	912	5,977	11,960	53	40,540	158,290	144,208	425,331
1930.....	8	1,523	115	.....	.....	.....	107,896	8,300	3,066	9,761	27,857	22	25,535	30,754	68,946	282,137
1931.....	7	1,358	154	.....	.....	.....	54,688	5,970	1,185	3,187	14,697	4	13,468	21,534	948	115,681
1932.....	8	1,446	166	.....	.....	.....	83,447	19,994	3,622	11,020	16,558	23	28,685	9,813	45,100	218,262
1933.....	10	1,685	110	64	.....	.....	53,431	5,701	426	4,554	13,299	.....	25,715	143,058	77,330	323,564
1934*.....	11	1,803	98	105	.....	.....	145,579	5,465	263	11,072	22,566	.....	30,751	35,847	219,331	470,904
1934†.....	.....	.....	.....	.....	.....	.....	133,159	4,713	173	10,760	1,607	.....	10,991	342	103,081	264,826
1935*.....	10	1,663	124	108	.....	.....	76,415	5,181	326	6,783	7,701	.....	63,933	182,528	72,353	415,220
1935†.....	.....	.....	.....	.....	.....	.....	57,212	4,205	212	4,984	350	.....	24,600	111,328	8,227	211,118
1936*.....	11	1,784	118	.....	.....	.....	165,651	7,128	461	8,426	20,647	6	51,243	23,842	188,538	465,942
1936†.....	.....	.....	.....	.....	.....	.....	164,408	6,680	310	8,142	.....	.....	22,572	2	30,663	232,777

* Represents actual pack, regardless where caught.

† Represents pack of Fraser fish, regardless where canned.

NOTE.—Licences issued include transfers from other districts.

NOTE.—1936† pack of Sockeye on Fraser, 164,408 cases, does not include 16,611 cases Sockeye caught on Fraser and exported and canned in Puget Sound canneries.

STATEMENT No. 6

PACK OF CANNED SALMON OF PUGET SOUND, U.S.A., FROM 1925 TO 1936

Year	Number of canneries operated	Spring	Sockeye	Coho	Chum	Pink	Steel- head	Total
		cases	cases	cases	cases	cases	cases	cases
1925.....	23	28,268	106,064	171,587	41,635	555,848	141	903,543
1926.....	14	27,763	44,569	120,846	112,411	2,125	63	307,777
1927.....	21	43,443	96,343	133,528	37,414	585,506	216	896,450
1928.....	12	24,628	61,044	92,770	145,735	5,816	265	330,258
1929.....	21	32,600	111,855	101,363	150,867	727,748	280	1,124,713
1930.....	13	29,378	352,194	122,691	64,234	3,712	397	572,606
1931.....	18	28,066	83,728	76,025	55,189	705,580	293	948,881
1932.....	10	23,964	78,319	60,740	146,151	1,677	60	310,911
1933.....	19	20,869	125,738	44,568	37,039	543,340	222	771,776
1934.....	20	14,398	352,579	69,254	73,337	3,606	.....	513,174
1935.....	14	9,737	54,677	71,985	15,604	377,445	.....	529,448
1936.....	9	6,328	59,505	29,191½	80,831½	1,345	.....	177,201

STATEMENT No. 7

STATEMENT OF HALIBUT LANDINGS—BRITISH COLUMBIA—1913 TO 1936

	Cwt.		Cwt.
1913.....	223,465	1925.....	318,240
1914.....	214,444	1926.....	315,095
1915.....	194,896	1927.....	271,354
1916.....	123,062	1928.....	302,820
1917.....	113,529	1929.....	304,364
1918.....	186,229	1930.....	254,796
1919.....	210,777	1931.....	182,005
1920.....	238,770	1932.....	168,847
1921.....	325,868	1933.....	170,372
1922.....	293,184	1934.....	182,602
1923.....	334,667	1935.....	171,143
1924.....	331,382	1936.....	168,121

STATEMENT No. 8

STATEMENT OF DRY SALT HERRING PACKS, 1918-1936—BRITISH COLUMBIA

Year	District No. 1	District No. 2	District No. 3		Total
			East coast	West Coast	
	cwt.	cwt.	cwt.	cwt.	cwt.
1918.....	20,000	.....	109,900	42,710	172,610
1919.....	4,000	.....	43,000	208,058	255,058
1920.....	807	1	176,640	334,720	512,168
1921.....	249	.....	231,240	248,482	479,971
1922.....	.....	.....	297,871	224,897	522,768
1923.....	.....	8,935	250,420	484,681	744,036
1924.....	.....	.....	305,266	548,277	853,543
1925.....	.....	.....	591,162	487,892	1,083,174
1926.....	11,134	4,120	596,114	327,207	938,647
1927.....	24,380	7,600	542,385	473,825	1,048,190
1928.....	46,995	.....	748,032	277,161	1,072,188
1929.....	78,800	5,160	691,673	140,751	916,384
1930.....	19,114	.....	546,342	240,517	805,973
1931.....	.....	.....	668,506	119,721	788,227
1932.....	.....	.....	219,398	50,022	269,420
1933.....	.....	.....	448,944	64,080	513,024
1934.....	.....	.....	310,026	104,600	414,626
1935.....	.....	.....	280,290	22,420	302,710
1936.....	.....	.....	357,337	26,000	383,337

DEPARTMENT OF FISHERIES

STATEMENT No. 9

CANNED PILCHARD PACK—BRITISH COLUMBIA—1917 TO 1936

Cases			
1917.....	1,090	1927.....	58,501
1918.....	63,693	1928.....	65,097
1919.....	63,065	1929.....	98,821
1920.....	91,929	1930.....	55,166
1921.....	16,091	1931.....	17,336
1922.....	19,186	1932.....	4,622
1923.....	17,195	1933.....	2,946
1924.....	14,898	1934.....	35,437
1925.....	37,182	1935.....	27,184
1926.....	26,731	1936.....	35,007

STATEMENT No. 10

PRODUCTION FISH OIL AND MEAL—BRITISH COLUMBIA, 1920-1936

Year	From Pilchards		From Herring		From Whales			From Other Sources	
	Meal and fertilizer	Oil	Meal	Oil	Whale-bone and meal	Fertilizer	Oil	Meal and fertilizer	Oil
	tons	gals.	tons	gals.	tons	tons	gals.	tons	gals.
1920.....					503	1,035	604,070	466	55,669
1921.....								489	44,700
1922.....					326	230	283,314	911	75,461
1923.....					485	910	706,514	823	180,318
1924.....					292	926	645,657	1,709	241,376
1925.....	2,083	495,653			347	835	556,939	2,468	354,853
1926.....	8,481	1,898,721	310	13,700	340	666	468,206	1,752	217,150
1927.....	12,169	2,673,876	1,838	170,450	345	651	437,967	2,512	375,130
1928.....	14,500	3,995,806	831	68,411	376	754	571,914	3,658	411,207
1929.....	15,826	2,856,579	932	34,924	416	779	712,597	3,671	461,915
1930.....	13,934	3,204,058	915	60,373	273	581	525,533	2,420	182,636
1931.....	14,200	2,551,914	3,904	110,810				1,747	241,682
1932.....	8,842	1,315,864	6,195	186,173				413	45,517
1933.....	1,108	275,879	4,078	316,213	249	223	509,310	1,596	187,560
1934.....	7,626	1,635,123	2,570	104,710	340	631	813,724	2,458	337,025
1935.....	8,681	1,649,392	5,262	306,767	211	354	426,772	2,147	247,437
1936.....	8,715	1,217,097	10,085	782,499	332	687	763,740	3,148	335,969

STATEMENT No. 11

NUMBER OF WHALES LANDED—BRITISH COLUMBIA, 1922-1936*

Species	1922	1923	1924	1925	1926	1927	1928	1929	1930	1933	1934	1935	1936
Sperm.....	38	94	83	76	80	82	83	146	147	190	265	175	311
Sulphur.....	4	62	56	29	14	10	47	16	10	1		6	3
Fin.....	94	166	125	135	124	138	140	168	62	17	71	20	48
Hump.....	50	78	47	40	25	21	21	9	12		14	1	14
Sei.....	1	53	100	68	25	7	13	67	89	1			2
Right.....			2		1								
Bottlenose.....		2	1	3			1	1					
Totals.....	187	455	414	351	269	258	305	407	320	209	350	202	378

* No whaling plants operated 1931 and 1932.

STATEMENT No. 12

STATEMENT OF FUR SEAL SKINS TAKEN AND LANDED, BRITISH COLUMBIA, 1912-1936

Year	District No. 2	District No. 3	Total
	No.	No.	No.
1912.....		205	205
1913.....	285	119	404
1914.....	95	257	352
1915.....	39	400	439
1916.....	21	138	159
1917.....	14	204	218
1918.....	78	10	88
1919.....	53	17	70
1920.....	502	556	1,058
1921.....	270	2,079	2,349
1922.....	291	639	930
1923.....	678	3,746	4,424
1924.....	370	1,862	2,232
1925.....	810	3,655	4,465
1926.....	655	2,169	2,824
1927.....	188	1,288	1,476
1928.....	465	1,625	2,090
1929.....	1,119	2,264	3,383
1930.....	195	2,102	2,297
1931.....	76	1,387	1,463
1932.....	88	1,699	1,787
1933.....	237	1,747	1,984
1934.....	98	158	256
1935.....	63	778	841
1936.....		1,888	1,888

STATEMENT No. 13

STATEMENT OF LICENCES ISSUED FOR SALMON CANNERIES AND SALMON FISHING GEAR (NOT INCLUDING LICENCES TO CAPTAINS AND ASSISTANTS ON SALMON SEINE BOATS OR ASSISTANTS ON SALMON GILL-NET BOATS.) BRITISH COLUMBIA—1926-1936

Kind of Licence	1926	1927	1928	1929	1930	1931	1932	1933	1934	*1935	1936
<i>District No. 1—</i>											
Salmon cannery.....	10	10	10	9	11	7	8	10	11	10	11
Salmon purse-seine.....	59	111	109	113	115	154	166	110	98	124	118
Salmon gill-net.....	1,063	1,249	1,303	1,473	1,523	1,358	1,446	1,685	1,803	1,663	1,784
<i>District No. 2—</i>											
Salmon cannery.....	50	48	47	45	26	21	28	29	31	26	27
Salmon trap-net.....	7										
Salmon purse-seine.....	193	244	158	153	152	71	53	55	109	102	99
Salmon drag-seine.....	14	16	9	9	9	9	9	11	9	9	9
Salmon trolling.....	717	938	864	738	891	884	875	882	937	930	964
Salmon gill-net:—											
Lowe inlet.....							29	59	67	58	74
Naas river.....	316	302	263	246	282	235	278	297	335	310	349
Skeena river.....	1,129	1,198	1,208	1,143	1,202	1,076	1,119	1,218	1,164	1,053	970
Rivers Inlet.....	1,115	1,273	1,117	1,149	1,449	1,144	1,461	1,603	1,899	1,699	1,802
Smiths Inlet.....	368	570	424	428	384	289	293	359	419	324	408
Bella Coola.....	192	195	173	236	359	240	238	228	285	268	265
Kimsquit.....	100	104	80	194							
Butedale.....	37	108	58	56	71	51	55	43	48	41	57
Namu.....	139	180	77	116	142	108	100	107	141	129	146
Queen Charlotte islands.....	27	42	22	3	6	5	4	2	19		24
Total, salmon gill-net, District No. 2.....	3,423	3,972	3,422	3,571	3,895	3,148	3,577	3,916	4,377	3,882	4,095
<i>District No. 3—</i>											
Salmon cannery.....	19	18	19	17	17	7	8	10	7	7	8
Salmon trap-net.....	7	7	7	7	7	7	7	8	8	8	7
Salmon purse-seine.....	252	308	239	218	191	157	104	183	187	191	188
Salmon drag-seine.....	27	30	13	13	12	12	21	20			
Salmon trolling.....	1,640	2,045	2,014	1,779	2,109	2,077	1,992	1,888	2,064	2,053	2,429
Salmon gill-net.....	364	422	454	565	643	387	336	512	646	673	741
<i>Whole Province—</i>											
Salmon cannery.....	79	76	76	71	54	35	44	49	49	43	46
Salmon trap-net.....	14	7	7	7	7	7	7	8	8	8	7
Salmon purse-seine.....	445	552	397	371	243	223	157	236	296	293	287
Salmon drag-seine.....	41	46	22	22	21	21	30	31	9	9	9
Salmon trolling.....	2,416	3,064	2,987	2,630	3,115	3,115	3,033	2,880	3,099	3,107	3,511
Salmon gill-net.....	4,850	5,643	5,179	5,609	6,061	4,893	5,359	6,113	6,826	6,218	6,620

NOTE.—During the season 1928 F. Miller's cannery at Vancouver, the Cassiar cannery on the Skeena and the Massett Cannery, Massett inlet, operated without licences, and are not included in the number of cannery licences shown above.

Commencing with year 1930 salmon cannery licences shown above were issued by the Provincial Fisheries Department.

*See statement 20, page 86.

DEPARTMENT OF FISHERIES

STATEMENT No. 14

STATEMENT OF POWER BOATS OPERATED IN DISTRICT No. 2, BRITISH COLUMBIA,
IN CONNECTION WITH SALMON GILLNET OPERATIONS

—	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936
Naas river.....	3	9	35	21	37	34	119	142	179	233	268	243	327
Skeena river.....	18	64	133	162	216	263	472	603	660	668	732	804	842
Bella Coola and Kims- quit.....	1	12	49	47	90\103	70	124	94	89	101	156	150	139
Central area.....		8	28	87	13\73	73		68	111	165	234	161	252
Rivers inlet.....	54	110	254	248	479	435	712	682	776	901	1,233	1,164	1,287
Smiths inlet.....	9	39	131	110	204	135	231	176	175	219	299	285	302
Queen Charlotte Islands.....					10								24
	85	242	630	675	1,049	1,010	1,658	1,765	1,990	2,287	2,922	2,807	3,173

STATEMENT No. 15

PACK OF SOCKEYE SALMON FROM RUNS TO FRASER RIVER, 1925-1936

Year	Fraser river canneries	Canadian traps in Juan de Fuca Straits	Puget Sound (U.S.A.) canneries	Total Cases
1925.....	31,523	3,862	106,064	141,449
1926.....	83,589	2,091	44,569	130,249
1927.....	57,085	4,337	96,343	157,765
1928.....	26,530	2,769	61,044	90,343
1929.....	60,407	3,480	111,856	175,743
1930.....	93,416*	5,334	352,194	450,944
1931.....	38,507*	2,440	83,728	124,675
1932.....	61,769*	4,000	78,319	144,088
1933.....	43,745*	8,721	125,738	178,204
1934.....	133,159*	6,117	352,579	491,855
1935.....	57,212*	5,610	54,677	117,499
1936.....	164,408*	3,837	59,505	227,750

* Does not include sockeye canned on Fraser and caught in other districts.

NOTE.—1934 pack at Fraser river canneries includes 5,643 cases sockeye caught on Fraser river and canned in other districts. A statement showing the yearly figures from 1876 to 1930 will be found in the departmental report for 1930-31.

NOTE.—1936 Pack at Fraser River canneries includes 18,320 cases Sockeye caught on Fraser and canned in other districts.

DEPARTMENT OF FISHERIES

STATEMENT No. 17

STATEMENT OF NUMBERS OF DIFFERENT SPECIES OF SALMON AND METHOD OF CAPTURE, REPORTED BY OPERATORS OF SALMON PURSE-SEINES, DRAG-SEINES, AND TRAP-NETS, AND BY SALMON CANNING, CURING, AND COLD STORAGE ESTABLISHMENTS, OF GILL-NET AND TROLL CAUGHT FISH, BRITISH COLUMBIA—1936

—	Sockeye	Spring	Blue-back	Steel-head	Coho	Pink	Chum	Total
Troll.....	1,927	741,162	444,560	6	2,076,633	6,108	1,300	3,271,696
Gill-net.....	4,228,135	857,862	45	254,006	860,480	3,272,208	1,185,813	10,658,549
Purse-seine.....	555,365	19,095	5,859	1,439	219,590	8,770,058	4,873,551	14,444,957
Drag-seine.....	47,948				9,419	65,296	8,852	131,515
Trap-net.....	44,356	16,313	363	1,059	36,391	2	4,749	103,233
Totals.....	4,877,731	1,634,432	450,827	256,510	3,202,513	12,113,672	6,074,265	28,609,950

STATEMENT No. 18

STATEMENT OF NUMBER OF SALMON CAUGHT BY PURSE-SEINES, SHOWN BY SEINING AREAS, SEASON 1936

Area	Sockeye	Spring	Blue-back	Steel-head	Coho	Pink	Chum	Total
1.....	695				335	1,517,837	295	1,519,162
2.....	686	28		9	8,528	418,088	453,516	880,855
3.....	7,293	129		26	2,957	998,829	85,200	1,094,434
4.....					2	3,036	1,064	4,102
5.....	23,924	13		10	34,023	1,179,072	84,646	1,321,688
6.....	31,890	65		86	41,666	2,603,120	369,384	3,046,211
7.....	24,144	353		96	19,877	513,644	154,392	712,506
8.....								
9.....		1			827	18	16,685	17,531
10.....	5				3,408	2,658	65,511	71,582
11.....					2,615		77,065	79,680
12.....	294,314	6,785	71	749	49,057	1,113,878	519,298	1,984,152
13.....	90,876	2,872	5,788	162	12,175	57,484	264,115	433,472
14.....					1,280		163,286	164,566
15.....					218		35,249	35,467
16.....					169		130,744	130,913
17.....					27		7,658	7,685
18.....								
19.....								
20.....					1,405		33	1,438
21.....	24	1,651		3	9,265	31,204	130,534	172,681
22.....		1			1,970	8,000	756,843	766,814
23.....	28,521	7,167		269	6,933	208	726,346	769,444
24.....	47,649				2,020		69,145	119,414
25.....	2,355				4,638		457,552	464,545
26.....	409	30		2	4,374		116,837	121,652
27.....	2,580			27	11,221	322,982	188,153	524,963
Totals....	555,365	19,095	5,859	1,439	219,590	8,770,058	4,873,551	14,444,957

STATEMENT No. 19

STATEMENT SHOWING PACKS OF CANNED SALMON, 1932-1936, WITH QUANTITIES GRADED SECOND QUALITY AND PERCENTAGES

	Sockeye	Springs	Steel-head	Blue-back	Coho	Pinks	Churn	Total
1932 Pack, cases.....	284,355	76,060	1,168	23,505	160,466	223,716	306,761	1,081,031
Grade B, cases.....	3,355	1,234		164	333	119	3,083	8,288
Per cent of Total.....	1.179	1.622		.575	.207	.053	1.005	.766
1933 Pack, cases.....	258,107	20,266	1,459	21,763	137,289	532,558	293,630	1,265,072
Grade B, cases.....	494			10	873	15,149	887	17,413
Per cent of Total.....	.191			.045	.635	2.844	.302	1.376
1934 Pack, cases.....	377,882	29,784	1,282	29,556	195,874	435,364	513,184	1,582,926
Grade B, cases.....	21,620	139	5		962	4,085	1,127	27,938
Per cent of Total.....	5.721	.466	.390		.491	.938	.219	1.764
1935 Pack, cases.....	350,444	21,920	596	15,319	216,173	514,966	409,604	1,529,022
Grade B, cases.....	3,435	659			3,840	20,528	5,601	34,063
Per cent of Total.....	.980	3.006			1.776	3.986	1.367	2.227
1936 Pack, cases.....	415,024	29,854	1,068	33,718	212,343	591,532	597,487	1,881,026
Grade B, cases.....	13,725				483	29	5,265	19,502
Per cent of Total.....	3.307				.227	.005	.881	1.036

RECAPITULATION SHOWING FIVE YEARS TOTALS AND PERCENTAGES
GRADED SECOND QUALITY OR GRADE B

Total Packs, cases.....	1,685,812	177,884	5,573	128,861	922,145	2,298,136	2,120,666	7,339,077
Total Grade B, cases....	42,629	2,032	5	174	6,491	39,910	15,963	107,204
Per cent of Total.....	2.522	1.142	.089	.135	.703	1.736	.752	1.460

STATEMENT OF FISHERY LICENCES ISSUED—BRITISH COLUMBIA—SEASON 1935*

STATEMENT No. 20

Variety of Licence	Issued				Transfers			Operating				
	White	Ind.	Others	Jap R.S.	Can- celled	Total	White	Ind.	Jap R.S.	Can- celled	Total	
Salmon trap-net	8	9				8						8
Salmon drag-seine	218	72			3	293						293
Salmon pise-seine	2,813	1,101	911	41	99	4,965	993	242	18	1,253	3	6,218
Salmon gill-net	2,275	590	155	5	13	3,038	64	5		69	99	3,107
Salmon trolling	140	301	514		2	957					5	957
Asst. salmon gill-net	72	43				165					2	165
Capt. salmon seine	1,009	661			2	1,672					2	1,672
Asst. salmon seine	221	47	147	2	11	428	221	47		147	2	428
Cod	90	26				116					11	116
Crab	23	1	88			112	23	26				112
Grayfish	29	1	14	3	1	48	29	1		88		148
Smelt	18	9	1	1	1	29	18	1		9	1	29
Small inshore dragger	70	10	27	7	4	118	71	10		27	4	119
Miscellaneous fishery							1					
Herring pound	9					9						9
Herring purse-seine	25		2			27				2		27
Herring gill-net	20		4	1	1	26	25			4	1	26
Capt. herring seine	13	2	4			19	13			4		19
Asst. herring seine	158	51	94			303	158	51		94		303
Pilchard purse-seine	21					21	21					21
Capt. pilchard seine	20	1				21	20					21
Asst. pilchard seine	131	6				137	131	6				137
Capt. halibut boat for bait	3					3						3
Totals	7,386	2,972	1,969	60	137	12,524	1,058	247	18	1,323	78	13,847

Indian permits, 2,078. Angling permits, 660 (4 cancelled).

LICENCES ISSUED BY PROVINCIAL GOVERNMENT

Salmon canneries	43	Salmon dry saltery	31
Pilchard canneries	2	Herring dry saltery	21
Pilchard reduction	7		

* This statement covering 1935 licenses is printed because some errors as to licences issued in 1935 appeared in tables published in the report for the fiscal year 1935-36.

APPENDIX No. 2

REPORT OF INSPECTION OF FISH AND PACKAGES AND TECHNICAL INSTRUCTION TO FISHERMEN

By J. J. COWIE, Director

INSPECTION OF SALTED HERRING, MACKEREL, ETC.

It may be again pointed out that this inspection is carried out under authority of the Fish Inspection Act. The act requires that all barrels, boxes and other containers used for packing and marketing such fish as come under the provisions of the act must be made and marked in accordance with the regulations adopted under the act. Further, that all such containers must be inspected and marked by a properly qualified officer before being bought, sold or used. Also, that all such fish as come under the provisions of the act must be cured, graded and packed in accordance with the requirements of the regulations and before shipment must be inspected by an inspecting officer.

During the year under review inspections were carried out by those of our regular fishery officers who were qualified and authorized to do so.

Atlantic Coast

Up to the end of December, 1936, over four thousand inspections were made of fish curing places and curing utensils therein for the enforcement of cleanliness and proper sanitary conditions. The reports of these inspections were satisfactory.

In all almost 400,000 empty containers of one kind or another were inspected during the year. Of these 693 were reconditioned and 1,158 condemned entirely.

There were 44,587 packages of mackerel inspected and of these 2,536 underwent reconditioning while 632 were marked "below quality." Of herring there were inspected 25,599 packages. Of these 950 were reconditioned and 247 marked "below quality."

It may be noted here that beginning with the year under review the regulations require herring to be packed in two grades; Grade A to have three qualities of fat herring and Grade B three qualities of herring that have little or no fat.

There were 7,815 barrels of alewives inspected and only one barrel had to be reconditioned. Of hard cured smoked round herring there were inspected 288,401 boxes. Of these 3,012 boxes had to be reconditioned, while only 20 boxes were marked "below quality."

The packing and marketing of Atlantic Coast oysters in the shell come under the provisions of this act. Consequently, there were 17,186 barrels and 2,638 boxes of oysters inspected. Of these five barrels were reconditioned and 33½ bushels condemned and confiscated because of the oysters being under the regulation size.

It may be here noted that oysters under the regulations may be marketed in barrels, half-barrels or boxes. The barrel must contain not less than two and one-half bushels of oysters in the shell; the half-barrel not less than one and one-quarter bushels of oysters in the shell. The boxes are of three sizes, one to contain one and one-quarter bushel, another to contain one bushel and the other to contain one-half bushel of oysters in the shell.

Every barrel and box when filled with oysters must be clearly marked with the name and address of the original packer or the first dealer who repacks the oysters, the minimum size of oysters in the barrel or box and the name of the

province and the area within the province from which the oysters were taken. A properly authorized inspecting officer must inspect all shipments and if he is satisfied that the barrels and boxes are in accordance with the requirements and that the oysters are not below the legal size he is required to place a mark on each package to show that it has been inspected.

The inspection regulations covering oysters were amended to require that, beginning with the year under review, any barrel or box of oysters when filled and ready for market that has been found to contain more than five per cent by count of what are known as "thin lipped" oysters shall be marked by the inspecting officer with the words "thin lipped." Thin lipped oysters are defined in the regulations as oysters that can be passed three-quarters of an inch or more through an opening three-eighths of an inch wide.

Any packer or owner of fish that have been inspected under the Fish Inspection Act who is not satisfied with the decision of the first inspecting officer has the right to appeal to the Minister for a reinspection. Under this provision of the act not more than six reinspections took place in the course of the year. These covered 200 empty barrels, 56 barrels of alewives, 65 barrels and one-half barrel of mackerel and 38 barrels of herring.

When the great extent of coast line which has to be covered and the great number of individual fishermen who pack small quantities of herring and mackerel in many out-of-the-way harbours and coves are taken into consideration, the foregoing record of reinspections, reconditioning and the comparatively small quantity condemned speak volumes for the greater care that is being exercised by both coopers and fishermen in the making of standard barrels and the packing of fish of good quality. Further, it reflects great credit on the inspecting officers who, by tactfully bringing home to fishermen and coopers the necessity for strictly adhering to the regulations, have raised the standard of barrel making and curing in a very few seasons while attending to their many other official duties.

Our officers have no direct jurisdiction over the making of wooden hoops to be used on pickled fish barrels, but by gradual, educative efforts, however, they have been able to induce practically all makers of wooden hoops to separate the best ones to be used on pickled fish barrels so that the others could be used on apple and potato barrels. This has been beneficial to the barrel makers because they obtain a somewhat higher price for the selected hoops and is, of course, beneficial to those who use the barrels as there is less waste and loss through broken and useless hoops.

Not all soft woods are capable of containing pickle when made up into barrels. There are inferior soft pine and fir woods which pickle simply filters through resulting in loss to all concerned. In some districts this inferior pine and fir is still used to some extent and in order to overcome this it was found necessary last year to adopt a regulation stipulating that spruce or hardwood only may be used for staves and heading of pickled fish barrels. The regulation does not become effective until after January 1st, 1938, which gives coopers ample time to adjust themselves to the new requirement.

Pacific Coast

As on the Atlantic coast the fishery officers on the Pacific coast, who are qualified and authorized to do so, carry on an inspection of dry salted herring.

This product is first of all salted into tanks and allowed to remain in pickle for a stipulated number of days. The fish are then removed from the tanks when a shipment is to be made and are packed into boxes of a standard size to contain 400 pounds. The curing of the herring, that is the length of time that the fish must remain in pickle, is supervised by the inspecting officers. Then when they are packed into boxes and ready for shipment they are inspected by the inspecting officers and marked accordingly.

Unfortunately, the only market for our dry salted herring is in China and conditions in that country have been such in recent years that packers have found it difficult to make any money or even prevent losses. With a view to remedying the market conditions that have prevailed for some years what was called the Salt Fish Board of British Columbia restricted the packing of dry salted herring in 1936 to 95,834 boxes. But for that restriction the pack could have been many times increased as herring were in abundance all through the season.

INSPECTION OF CANNERIES AND CANNED FISH

Atlantic Coast

Under the Meat and Canned Foods Act and the regulations adopted thereunder all fish and shellfish canneries and the processes of canning are systematically inspected by our fishery officers who are qualified to do that work.

During the year under review there were operated in the provinces of Nova Scotia, New Brunswick and Prince Edward Island, and the Magdalen Islands, 256 lobster canneries, 15 clam canneries, 12 other canneries where sardines and other fish were canned.

In so far as lobster canneries are concerned our inspecting officers carry out a systematic plan of grading these by assigning marks to each cannery for construction and equipment and for operating methods and sanitation. That was originally put in effect by the scientific staff of the Fisheries Experimental Station at Halifax, who, after giving adequate instruction to our fishery officers, left the annual grading in the hands of the latter. Last year, however, the scientific staff carried out another grading with a view to checking up the grading of the fishery officers. The result was considered quite satisfactory. This grading scheme has undoubtedly raised the standard of lobster canneries and lobster canning on the Atlantic coast to quite a high pitch and the plan is now operating to the satisfaction of everybody connected with lobster canning.

Our officers give particular attention to testing the weight of lobster meat in the cans at each cannery. Considering the fact that 255 lobster canneries are in operation the number of canneries at which lightweighters were found is comparatively speaking very small indeed. When parcels of lobsters are found to contain light weight they cannot be removed until each can has been stamped with the word "underweight." That, of course, tends to make every lobster packer careful to see that he does not get into trouble through underweight cans.

CANNED SALMON INSPECTION

Pacific Coast

It will be recalled that in the previous year's report on canned salmon inspection it was mentioned that the department had decided to disband the original Board of Inspection and appoint independent inspectors absolutely free from any interest in trading in the product who would have qualifications to conduct the inspection on a scientific basis.

The old board consisted of three highly qualified men, but unfortunately they were engaged in the business of brokers or buyers of canned salmon. It was because of this that they were so well qualified to inaugurate the inspection system; consequently, the department could find no better way of beginning the inspection work. To remunerate those three men of the Inspection Board the industry was charged a fee of one cent per case on all canned salmon inspected.

The new system is an entirely different one in that there is no inspection board but in its place three scientific men have been appointed as departmental officers with fixed salaries to carry on the work of inspection. The name applied to the new institution is the Canned Salmon Inspection Laboratory. The staff consists of a chief chemist and two senior laboratory assistants. These were duly selected and appointed by the Civil Service Commission. They took over

full charge of the inspection on the first of April, 1936. As a result of the appointment of the scientific inspectors as departmental officers at specified salaries the department was enabled to recommend to the Government that a fee of one-half cent per case only be charged for inspection in place of the one cent hitherto charged.

The result of putting in operation this changed system has been that all dissatisfaction with the personnel of the board has been entirely eliminated and the canners have come to realize that through the scientific knowledge that the chief chemist is able to bring to bear on the inspection system a much more systematic and technical method of inspecting and testing samples of canned salmon has been developed.

It may be said, too, that the inspection laboratory is prepared to go much further in the matter of classifying grades of salmon just as soon as the industry indicates its readiness to have a more intensified inspection put in effect.

From first of April, 1936, to the end of December of that year the inspection laboratory carried out 2,966 inspections. These covered samples drawn from 1,823,931 cases. Out of the total number inspected 1,797,377 cases were found to be up to the standard required of freshness, firmness and packing and therefore became entitled to the official certificate of approval. The number of cases that did not come up to the required standard was 26,554; 16,972 of these were of the sockeye variety. Those falling below the standard required for a certificate are either classified as Grade B or, if unfit for human food, condemned and destroyed. There were 21,798 cases classified as Grade B and 989 cases were found to be below that grade and as a result were destroyed. Included in the number that fell below the certified standard are 3,767 cases of what are known as "tips and tails." These do not come under the certificated class, but as a result of inspection no second grade tips and tails were found.

INSTRUCTION IN FISH CURING

Atlantic Coast

During the year under review the department continued the work of instructing fishermen on certain parts of the Atlantic coast in the curing of cod in pickle, the making of boneless fish and in the Gaspé style of curing and drying cod.

COD CURING IN PICKLE

In Nova Scotia this work was carried on in the counties of Shelburne and Lunenburg, but mainly in the eastern part of the province from Halifax to Canso. The island of Cape Breton also was covered from Richmond county round cape North to Cheticamp, Grand Etang and Margaree harbour. Work at Cariboo, Pictou county, was developed further in the course of last year.

Attention was given to Prince Edward Island by two instructors, one at the eastern end and one at the western end.

At the beginning of the season, owing to a large carryover in the United States markets of pickle cured and boneless fish, the prospects were not at all bright. Before the close of the season, however, the outlook improved very much and prices stiffened for good quality product.

Our instructors endeavour to put producers of quality that can be assured in touch with buyers so that in addition to giving instruction in the actual handling of the knife, the instructors help very considerably by advice and otherwise in disposing of the product.

Gaspé Cod Curing.—As in the previous year the department employed two qualified men to give instruction in the Gaspé style of curing. One man operated in the Magdalen Islands, the other in the county of Gloucester, New Brunswick, mainly on the islands of Shippegan and Miscou.

When the fishing boats returned from the fishing grounds the instructors visited the landing places and gave instruction to the fishermen right at the time of landing as to how the fish should be split, washed and salted for the Gaspé style of curing. Afterwards when the fish were being dried they visited the drying flakes and gave advice and supervision in connection with the drying methods. Later when the fish were being prepared for shipment they gave advice as to grading, etc.

EDUCATIONAL COURSES OF INSTRUCTION

Atlantic Coast

Again the Biological Board was able to arrange for a series of courses of instruction during the year under review.

Unfortunately, owing to a re-arrangement of the staff of the Fisheries Experimental Station at Halifax that station was unable to furnish a course as in past years.

As part of the undertaking when the board's station at Grand river, in Gaspé, was established, arrangements were made for a course of instruction there. It was decided, therefore, to put on a course for three weeks running from the eleventh of May. It was on practically the same lines as the course given at the Halifax station. It was anticipated that facilities would be available for approximately thirty fishermen who were to be asked by public notice to apply to the director of the station giving particulars as to whether the applicant was a bona fide fisherman, his age and educational qualifications. Arrangements were made with the department to have two of its experts give instruction on cod fish curing and in the curing of herring and mackerel, also in barrel making. French interpreters were to be provided if required. Arrangements were made to have a capable man give instruction in motor engines and how to operate them. Also, the scientific staff of the station undertook to give a series of lectures on the biology and life history of the more common fishes of the gulf of St. Lawrence.

In addition to the course as outlined above Doctor Labrie, the director of the Gaspé station, issued circulars of an educative nature to all fish firms on the coast. Those circulars explained what the station stood for. They also dealt with fish smoking, the making of cod liver oil, salting of fish, sanitation of fish curing establishments and of boats. Meetings were also held with the fishermen in the principal fishing centres of the south coast of the peninsula in so far as transportation facilities would permit.

Pacific Coast

Due to the interest aroused by the course of instruction given at Nanaimo, British Columbia, in February, 1936, the British Columbia Trollers' Association desired that another one of a similar type be given in the late fall of that year. A short course was therefore arranged for extending from November 23 to 26, inclusive, at Nanaimo. Over twenty fishermen from various parts of Vancouver island attended the lectures. Two subjects mainly were stressed throughout, fish spoilage and handling and navigation. Incidental lectures were given by members of the staff of the Nanaimo and Prince Rupert stations on other matters of a more general interest.

It was evident that the lectures were appreciated and the discussions following each were always very animated and numerous problems outside the sphere of the course were submitted by the fishermen for solution.

Again as a result of the interest taken by the fishermen in these instructional lectures the board was requested by the United Fishermen's Union of British Columbia to arrange that a similar course be given at Vancouver at a date that would be suitable for the attendance of fishermen. The dates were therefore set for January 18 to 21 inclusive. The place of meeting was the headquarters

of the United Fishermen's Union at Hastings street, Vancouver. The subjects dealt with were tides, fishes of the waters of British Columbia, elementary bacteriology, the policy of the Department of Fisheries in the conservation of the fisheries, history of the halibut fishery, pilchards, herring, the role of fisheries research in the fishing industry, life history and migratory habits of salmon.

In view of the fact that this was the first attempt to give such a course of instruction to fishermen in Vancouver or that vicinity and as it was looked upon in the nature of an experimental venture, it seems, judging from the comments of those who attended the lectures that the success of the course was considered to be gratifying.

APPENDIX No. 3

ENGINEERING BRANCH

REPORT BY CHARLES BRUCE, A.M.E.I.C., FISHERIES ENGINEER

The report of the Engineering Branch covers the works of a technical nature carried out by the department in the Maritime Provinces and in British Columbia where the fisheries are administered by the federal government. The services of the branch are available, as well, to assist and co-operate with local fish and game protective associations in these provinces in the selection of sites and surveys for rearing ponds and hatcheries, to design and supervise the construction of bait freezers where they are built under subsidy from the department, and to design and supervise the construction of fishways built by the owners of dams under the requirements of the Fisheries Act. The supervision of the leasing of areas for oyster culture in Prince Edward Island, which is under departmental administration, also comes within the work of the branch.

Stream improvement which may involve the construction of storage dams and small constructions in streams to improve the conditions for fish particularly during low water periods, as well as the prevention of erosion of stream banks and other works of a like nature, has been receiving attention during the year. As substantial progress in dealing with problems of this kind has been made in New York State, a departmental engineer visited a number of New York stream improvement works to examine the methods employed so that, if found suitable, they might be applied on any Canadian streams where comparable conditions might exist.

An examination was made by an engineer of the conditions on the Columbia river at Bonneville, Washington, where a large dam is being constructed by the United States Government and where extraordinary measures are being taken to safeguard the salmon runs which ascend the river to the spawning grounds in the upper reaches. Such inspections are of definite informative benefit and will prove of value should the department later be confronted with problems of a like character on Canadian rivers. It is hoped to make further inspections of this development as the work progresses and thus to add to the information already secured.

The policy of requiring local fishery inspectors to investigate conditions where obstructions to the ascent of fish in smaller streams occur, and to supervise their removal when the services of an engineer are unnecessary, was continued during the year under review. In British Columbia departmental patrol boats equipped with the necessary tools to enable the crews to remove minor obstructions obviate the need for employing additional labour in some cases.

Following conferences with the Department of Pensions and National Health, an arrangement was made under which applications for certificates to export shellfish from the Maritime Provinces are made direct to the Department of Fisheries through the local Fisheries Inspectors, and the supervision of this work was placed under the Engineering Branch.

All work of the branch in British Columbia is under the direct supervision of Resident Engineer John McHugh, with headquarters at Vancouver.

BUILDING FISHWAYS AND CLEARING RIVERS

NOVA SCOTIA

Medway River, Queens County.—A design was prepared for a sluice for permitting the descent of fish from the power canal of the pulp mill dam at Charleston on this river. The owners were required to make the installation under supervision of an engineer.

Terence Bay Brook, Halifax County.—The installation of a fishway over a small falls on this brook, a survey for which was made during the previous year, was completed by the department.

Grand River, Richmond County.—In order to secure definite information as to whether salmon can ascend a falls on this river a trap was installed some distance above it. No fish were taken, and, while it was known that an odd fish did get past under certain water conditions, the evidence secured leads to the conclusion that the falls would need to be improved or an adequate fishway installed to make ready passage possible.

Small obstructions to the ascent of fish were removed from Doctor's brook, Cape Breton county, and a channel was cut through a gravel bar at the entrance of Trout brook, lake Ainslie, to permit sea trout to enter the stream. At one point on the Shubenacadie river in Hants county, where the grass has grown so high and thick that numerous young alewives were being destroyed by eels, a channel was opened up to permit their safe descent.

Inspections by an engineer were made of alleged obstructions to the ascent of fish in Bloody creek, a tributary of the Clyde river, and at Downey's brook and Fresh river, all in Shelburne county. It was found that while conditions might be unfavourable at very low water the obstructions, which consist principally of large boulders, would be pretty well covered under ordinary water conditions. It was accordingly concluded that no work should be done, pending definite evidence that the streams are obstructed with the water at a stage when fish would be expected to ascend. Inspections were also made of the hydroelectric power dam on the Roseway river and of the Quinn's dam on the Clyde river to obtain information regarding conditions for the ascent of fish.

An inspection of the Southwest Margaree at McLennan's intervalle, where it was represented the river had become diverted, showed that while such a diversion had taken place, the main channel of the river was still carrying the greater part of the flow and was quite passable for fish.

NEW BRUNSWICK

Magaguadavic River, Charlotte County.—Severe damage was caused to the fishway at the mouth of the river by ice which accumulated in tons, due to spray from the falls freezing over it during the previous winter. When a large mass of this ice fell away in the spring, it carried about fifty feet of the wall of the fishway with it and generally demolished that section. The limited available space in the gorge where the fishway is located made repairs difficult but a heavier wall was built and the top of the fishway reinforced with pieces of railway rails which were imbedded in the rock and the wall to form ties.

Following representations that provision should be made for the ascent of salmon past the Flume Ridge dam on this river, an engineer attended at a conference of those interested and after a full discussion it was decided to provide a sluice in the dam so located that, it was thought, salmon might pass through it. While the dam was open to build the sluice a few salmon passed but after it was closed none were seen, although careful watch was maintained. It will accordingly not be possible to determine if the sluice is efficient until the coming year.

Salmon River, Victoria County.—An engineer inspected the situation at this dam where the fishway had been broken away by ice during the previous winter. Information was afforded from which the structure was rebuilt.

Meduxnekeag River, Carleton County.—At the request of the Commissioner of Fisheries for the State of Maine surveys were made of two falls on this river between the New Brunswick and Maine boundary, and information obtained from which designs for fishways to overcome the falls were prepared. As the river flows from the State of Maine, the Canadian authorities have not considered any action to provide for the ascent of salmon but the American authorities indicated that if the necessary information were afforded they would consider carrying out the work.

BRITISH COLUMBIA

Atnarko River, Bella Coola District.—A log jam of considerable size, averaging 100 feet in width, nearly 400 feet long and with an average depth of six feet, was removed from the bed of the Atnarko river during April and May. A channel, 75 feet in width, was opened through the jam into which practically the entire flow of the river was concentrated and all material removed was carried down this channel clear of the jam. Most of the jam was of old formation, with the result that much of the underlying material had become completely buried in silt and gravel in the bottom of the river bed and was so water-logged that it could not be floated. As the work developed, however, the stream velocity increased to such an extent that all of the excavated material was carried away to safety. This stream appears to require attention from year to year. The heavy freshets of the early fall carry large quantities of debris—whole trees with their roots attached, which are washed down by slides in the upper reaches. This debris comes to rest in bends of the stream where the velocity of current is reduced and the nucleus of a jam is formed. There is no means of preventing the formation of these jams, as long as floods occur and timber remains fringing the banks of the streams in the upper watershed. It is estimated that from 10,000 to 20,000 sockeye reached Lonesome lake, the principal spawning ground during the last spawning season. Thus the area is of considerable value and its maintenance will require the expenditure of further sums of money from time to time as obstructions in the streams bed accumulate.

Coquihalla River.—An obstruction which prevented the free ascent of trout in the Coquihalla river was removed. The obstruction consisted of a huge rock boulder in midstream, which prevented the passage of fish because of the extremely low water prevailing. The boulder was completely shattered with explosives and, as a result, the twelve-foot fall was broken up and a twisting grade created by which fish were able to ascend without difficulty.

Goat River, Long Lake, Smiths Inlet.—A log jam at the outlet of Long lake was removed during October. The jam, which stretched completely across the river at this point, measured approximately 90 feet across and about 50 feet in length. The key log consisted of a large spruce tree six feet in diameter and sixty-five feet long which held up a mass of trees both floating and submerged, varying in diameter from two to four feet, with here and there roots of fairly large dimensions.

Sproat River, Vancouver Island.—Two log jams in the bed of Sproat river, one immediately above and overlying the crest of the falls and one a few hundred feet above, were removed. Some assistance with both labour and machinery was contributed by the owner of the mill on Sproat lake who acknowledged responsibility for a portion of the material in the upper jam. At both jams, conditions in the stream bed for the passage of salmon are difficult at times and the existence of the log jams intensified the difficulties so that their removal became necessary.

Nanoose Creek, Vancouver Island.—As a result of the removal of various obstructions during past years in the lower reaches of Nanoose creek, salmon were able to reach the falls approximately three miles from its mouth. The falls, consisting of a solid outcropping ledge six feet high, proved to be a barrier beyond which salmon were unable to proceed. Immediately above the falls the stream was obstructed by an old log jam of considerable size stretching clear across the river. This jam, it was felt, would prove a complete obstruction once salmon were enabled to surmount the falls. Arrangements were made to open up the falls by cutting a trench through them and providing two steps therein. The log jam was disposed of by burning.

Minor obstructions consisting of logs, roots and other debris were removed under recommendation by the local supervisor from the following streams: Boughy Bay creek, Yakoun river, Grassy Bay creek, McKay creek, Holden lake, Chameleon creek, Shannon creek, Cherry creek, Beaver creek, Blood creek, Coal creek, Deer creek, Qualicum river and Rogers creek. Where it can be shown without doubt that obstructions are the direct result of logging operations, the persons or firms responsible are ordered to remove the obstructions at their own cost.

Maggie River, Vancouver Island.—An instrumental survey of the falls at the mouth of this river was made and designs and estimates for the construction of a fishway prepared.

Puntledge River, Vancouver Island.—A trap was installed at the head of the fishway in the dam at Comox lake to secure definite information as to the movements of fish. While a few trout passed through the fishway and into the trap, no salmon were taken. Investigations appear to confirm the opinion that the main spawning grounds are in the river below this dam.

Plans were prepared and served on the owners of a dam on the Upper Puntledge river, requiring the installation of a fishway therein for the passage of trout which frequent this part of the river for spawning.

Miller Creek.—This stream, which is tributary to the Cheakamous river, is frequented by trout for spawning and it was necessary to prepare plans for a fishway for a dam which had been built on it.

STREAM IMPROVEMENT

At a conference of departmental and Biological Board officials held to consider work of this nature, the Fisheries Engineer was appointed a member of a committee to deal with the question of stream improvement as a means of bringing about better conditions for fish. Consideration was given by the committee to the improvement of water conditions during the dry seasons by providing storage dams as a means of regulating the flow, thus making the streams more attractive to ascending fish. It was realized that with the somewhat limited authentic knowledge available any work along these lines should be confined at first to that of an experimental nature, and the committee recommended, subject to proper investigation, several rivers which appeared suitable for such an experiment. As investigations into the life history of the salmon were in progress by the Biological Board on the Margaree river, it was considered advisable to make an instrumental survey to establish the cost of providing storage from lake Ainslie, although this river had not been included with those recommended by the committee. The cost as revealed by the survey was deemed too great to justify proceeding at the present time.

An instrumental survey was made at Great Pubnico lake from which the Barrington river, Shelburne county, flows, and preliminary information secured from the standpoint of water storage. Further particulars and data are being obtained.

Burpee brook, near Fredericton, New Brunswick, was investigated for the purpose of establishing whether it would be practicable to establish low dams to create pools for the improvement of conditions for trout. A number of sites suitable for such dams was selected.

An instrumental survey was made at the outlet of Loch Lomond lake near St. John, New Brunswick, where it was represented a screen would prevent the descent of fish. The matter is being further investigated.

FISH CULTURAL ESTABLISHMENTS

NOVA SCOTIA

Antigonish Hatchery.—Three circular rearing ponds, each fifty feet in diameter, with the necessary water supplies and drains, were constructed. Arrangements were made in these ponds for placing fences to hold fish during spawning operations. These may be removed when not required.

The floor tanks in the hatchery were rebuilt with the screen ends enlarged the full width to admit of providing larger screen area and reducing the suction. The outlet drains were deepened to facilitate cleaning the tanks.

Cobequid Hatchery.—Twenty-four circular ponds, each twenty-five feet in diameter, were built on the hatchery grounds, including the water supply and outlets. The work involved laying 770 feet of fourteen-inch wood stave pipe for the water supply and the construction of a main drain 390 feet long, into which the branch drains from each pond enter, with the necessary off-take ditch. As the soil where the ponds were built is somewhat porous it was decided to experiment with lining the ponds first with a layer of strong paper with fibre strands between cemented plies, this being laid on a sand bed, and then with a mixture of clay and sand puddled in to a depth of four inches. It is anticipated that this method may give some trouble at first, due to sloughing, but it is hoped that, with consolidation of the bottom, it will prove effective and if so it will be much cheaper than concrete lining.

A well with five-inch casing was driven to a depth of 252 feet to afford a domestic water supply. While a supply was obtained it unfortunately was so saline as to be unsuitable. The supply is now being taken from the adjacent river.

A 1,500-watt lighting plant was installed to supply electricity for lighting the hatchery establishment.

Considerable grading and improvement of the grounds around the buildings were done during the year, material from the excavation of the ponds being used for the purpose.

Margaree Hatchery.—In order to provide for the installation of power to operate a feed grinder and eventually to supply electricity for lighting purposes, the office in the hatchery was converted into a feed room, a concrete floor with drain being laid. The engine and feed grinder were installed. Following an instrumental survey and the preparation of plans, construction was commenced on a system of circular rearing ponds, excavations and drains for five being completed. It is proposed to complete this system during the coming year. Designs and specifications for a new dwelling were prepared and a small plot of land on which to erect it was secured adjacent to the hatchery property.

Middleton Hatchery.—The hatchery roof was reshingled, the foot troughs renewed and all buildings were painted. Extensive repairs were made to the ponds at Stevens brook, all old woodwork being renewed.

Grafton Brook Rearing Ponds.—The dam for water supply and a system of fifteen circular ponds, each twenty-five feet in diameter, including the necessary water supply pipe lines and drainage, were completed, and will be ready for

operation in 1937. A building measuring 39 feet long and 21 feet wide was built to provide facilities for garage for a truck, icehouse, feed room and cold storage room, which is insulated with cork board and fitted with retorts to provide ice and salt refrigeration. Surveys of lands to determine the acreage that would be flooded by the dam on Grafton lake were conducted in the vicinity of the outlet.

Margaree Salmon Pond.—An inspection was made for securing information in connection with repairs to the cribwork of the pond and renewal of the spawning shed.

Lindloff Hatchery.—An inspection of the plant was made in connection with proposed repairs to the hatchery building and an extension of the rearing pond system.

NEW BRUNSWICK

St. John Hatchery.—The main drainage culvert from the concrete rearing ponds was found to have so decayed that renewal was necessary and a 20-inch wood stave pipe was laid to replace it.

Florenceville Hatchery.—In order to provide better facilities it was decided to move a system of troughs, which had been operated immediately outside the hatchery building, to a new location immediately below the hatchery supply dam. A rough building, 42 feet by 50 feet, was erected to house the troughs and a water supply was obtained by piping from the dam.

Grand Falls Hatchery.—Following an instrumental survey and the completing of designs, four circular ponds, each 25 feet in diameter, with the necessary water supply pipe line and drainage culverts were completed. As the soil was gravelly and porous it was necessary to line the ponds and a method similar to that adopted in the construction of the Cobequid Hatchery ponds was used. The hatchery, dwelling and other building were wired and a 1,500-watt electric lighting plant was installed. Certain repairs were made to the dwelling.

Miramichi Hatchery.—The roofs of the main hatchery and the annex were re-covered, the former with patent shingles and the latter with three-ply roofing. As there was evidence that dry rot had occurred under the main roof, louvres were put in the gable ends of the building to provide ventilation.

Hatchery Sites.—Examinations of sites for a proposed hatchery establishment in Madawaska county were made at Daigle, Baker, Blanchette, and Trout brooks and at Green and Iroquois rivers. The site at Iroquois river was decided to be the best and a complete instrumental survey was made. A weir was also installed to obtain a record of the water flow.

As the water conditions at the Restigouche hatchery are not suitable for a modern establishment, and as the building is in such a poor state of repair, that entire reconstruction will be necessary, it was decided to obtain information regarding possible better sites in the county. Instrumental surveys were made and weirs to obtain water discharge records were installed at sites examined on Walker and Black brooks and on the south branch of Charlo river.

PRINCE EDWARD ISLAND

Kelley's Pond Hatchery.—A new garage building measuring 12 feet by 20 feet was built and part of the dwelling roof reshingled and gutters repaired.

Sites for Rearing Ponds.—Examinations for the selection of sites for the establishment of rearing pond systems were made at the following places:—Fullerton creek, Milton and Sentener brooks, Bannockburn, Upper Crosby, Winter, Compton, Little Tiguish, Green, Rix's, Wright, Dunk, Wilmot, Cardigan, Brooklyn and Kanis streams. The most promising sites were selected on the latter three and instrumental surveys were made and weirs installed to obtain a record of the water flow.

LEASING OF AREAS FOR OYSTER FARMING

During the year 50 leases of unproductive bottom at suitable places in Prince Edward Island were issued. The total number of leases now in effect is 149, covering 571.85 acres. In addition to the leases issued there were at the end of the year 440 applications before the department. As applications for leases had accumulated to such numbers that it would be impracticable to expect that the intermittent services of such local surveyors as could be obtained would be likely to meet the situation, the appointment of a permanent employee qualified to do this work was made. In addition to surveying he gives attention to the collecting of returns required from lessees and acts as assistant to the biologist in charge of oyster investigations at the biological station at Ellerslie. During the year 137 areas were surveyed. A detailed report of oyster cultural work by the department will be found in Appendix No.

MISCELLANEOUS

Bait Freezers.—Following an agreement under which the department agreed to assist the Three Rivers Fisheries at Georgetown, Prince Edward Island, in the erection of a bait freezer, it was necessary for an engineer to approve the plans and specifications and to inspect the construction of the plant.

Coarse Fish Traps.—Two traps for the capture of coarse fish in waters in the Okanagan district of British Columbia were constructed during the year according to plans prepared by the Engineering Branch. One of these was placed in the narrows connecting Woods lake with Kalamalka lake and one in the bed of Otter creek. These traps have been installed principally for the capture and destruction of carp and suckers, neither of which are used for human food. Destruction of coarse fish has been constantly advocated by local fish and game associations and endorsed by officers of the Biological Board. Considerable success has attended the installation of traps and the captured coarse fish are mainly used by local residents as fertilizer.

Pollution.—(a) *Winfield Irrigation District, Okanagan.*—An examination of conditions with respect to pollution of a domestic water supply at Winfield, Okanagan district, was made under instructions. Dead and decaying fry in the pipe lines were alleged to be the source of the pollution. It turned out, however, that subsequent to complaints being received, certain improvements in the method of screening at the intake had been made by the owners and the trouble removed. No complaints have since reached the department in connection with this matter.

(b) *Bevan Mines, near Cumberland, Vancouver Island.*—Alleged pollution of the Puntledge river as a result of re-opening the coal mines at Bevan, Vancouver Island, necessitated an examination of conditions associated with the disposal of liquid mine wastes pumped from the workings and finding their way to the sea through the natural water course. The Biological Board is making a chemical analysis of this water and should it be indicated that it contains substances injurious to fish life further action towards purification will be recommended.

(c) *Millstream and Keighley creeks, Vancouver Island.*—A situation similar to that at the Puntledge river exists in connection with these two streams, both in the vicinity of Nanaimo. As in the former case, chemical analyses are being made before further action is taken.

Chapman (Mission Creek).—Early in the year the Columbia Power Company submitted plans to the Comptroller of Water Rights and requested approval of a scheme to divert five cubic feet of water per second from this stream for domestic power and light services in the vicinity of Sechelt. Objection to the

proposal was registered by this department on the ground that the bed of the stream was used as a spawning ground by both coho and chum salmon and that the diversion of the proposed amount of water in the fall months, when the natural flow of the stream is low, would seriously affect the stream's value as a salmon producer. An engineer attended the final hearing on the matter in Victoria, but, notwithstanding the objection previously recorded and a verbal objection accompanied by data, the licence was granted.

Fisheries Warehouse and Repair Shops, New Westminster.—Preparation of plans of this proposed work necessitated several conferences with officials of the Public Works Department. Tenders on the plans prepared in the Fisheries Engineer's office in the previous year were rejected and new plans were ordered, to include marine ways. These plans are now in course of preparation in the Department of Public Works, with the collaboration of an engineer of this branch.

Fisheries Station, Schooner Passage, Rivers Inlet.—Two additional bedrooms and a bathroom were added to the residence at this station.

APPENDIX No. 4
**REPORT OF THE BIOLOGICAL BOARD OF CANADA
FOR THE YEAR 1936**

BY THE CHAIRMAN, A. T. CAMERON, WINNIPEG

The first chairman of the board, Dr. Edward E. Prince, died on October 10 last. Illness had prevented him for some years previously from taking an active share in the board's work, but he had retained keen interest in its progress. The executive has minuted the following appreciation of his work: "With the background of marine investigations in Scottish waters, in which he had taken part, he advocated 'A Marine Scientific Station for Canada' very shortly after he assumed his duties in this country in 1893, and this appears to have been the initial step in the movement to which the Biological Board owes its existence. When in 1899 a Canadian Marine Station first became a fact, he was chosen as the director. With enlargement of the work he became Chairman of the Board of Directors of the Biological Stations, and continued as chairman when this became by Act of Parliament in 1912 the Biological Board of Canada. In 1921 he resigned the position of chairman to take that of secretary.

"He was widely known for his investigations on the early life histories of fishes of the waters of Great Britain, and he continued work in this field after coming to Canada. With extensive knowledge of the fisheries and strong interest in scientific research he stimulated a large part of the investigations carried on by the board. By charm of manner and breadth of interests he exercised a wide influence in a multiplicity of personal contacts throughout Canada, both as Commissioner of Fisheries and as an officer of the Board. His passing marks the end of the first stage of the work of fisheries investigation for which the Board stands."

Dr. Marie-Victorin, Professor of Botany in the University of Montreal, resigned from the board last June on account of pressure of other duties. He had been a member of the Board since 1927, and of the executive for the period 1928 to 1933. We lose his services with regret.

It is again my pleasant privilege to record the continued close co-operation between the board and the department, the faithful attendance of the board's executive and sub-executives to their duties, and the whole-hearted and loyal co-operation of the Directors and their staffs. I wish once more to emphasize my own indebtedness and that of the Board to Mr J. J. Cowie, the honorary secretary-treasurer, for the invaluable guidance which he is able to give us through his long and wide experience in fishery matters. Mr. F. O. Weeks, representative of the Treasury, has helped us very greatly by continuing to act as honorary assistant-treasurer, and by his sound advice in all matters concerning our financial procedures.

One of the most important accomplishments of the board during the past year was the establishment of a station in the Gaspé peninsula. Following the provision of the necessary money by Parliament, last July a committee of four members of the board, together with the Director of the Atlantic Fisheries Experimental Station and Dr. Arthur Labrie, Director-designate of the new station, carefully examined all that part of the Gaspé coast which might be considered as potentially suitable for the station, and unanimously recommended that, initially, it be placed at Grande Rivière. This committee further consulted as many officials and others as possible, during their visit, in order to get a clear idea of the type of work in which the station could be most helpful to the fishermen and fishing interests of the peninsula. I believe I am correct in stating

that none of our stations has had its location selected with greater care and forethought. In its position on the southern coast of the peninsula it should, when fully functioning, be able to serve not only the greater part of the peninsula itself, but also the northern coast of New Brunswick and the Magdalen Islands as well. This Gaspé Fisheries Experimental Station was opened early in August, and we hope to be able in the next report to record hopeful results from its creation.

In January, 1936, the Board co-operated with the National Research Council in calling a meeting of representatives of all bodies throughout the Dominion interested in fish culture in fresh waters, both in its relation to the commercial and to the sports' fisheries. An excellently attended meeting was held, as a result of which a National Committee on fish culture was formed, with duties (i) to act as a clearing house for information and suggestions regarding every branch of fish culture, (ii) to promote the co-ordination and development of research and fish cultural technique in fresh water, to consider what researches should be undertaken, and to recommend accordingly, and (iii) to advise such other action in respect to the science and technology of fresh water fish culture as may be deemed desirable. This committee will help to bring into closer relationship the research work that is being carried on under Dominion and provincial auspices.

For some time the members of the Board have felt that the Act under which the Board is constituted requires revision, in order to enable the Board to carry out its functions as the Research Board for Fisheries with greater efficiency. A committee of the Board has, during the past year, considered what changes in the Act could best bring this about, and the Board, at its meeting in January, 1937, made certain recommendations to the minister towards amending the Act.

The Board now operates five stations and several sub-stations, as follows:—

Atlantic Coast

St. Andrews, N.B. Atlantic Biological Station.

Field work on sea-fishery and fish-cultural problems is carried out at many points in New Brunswick and Nova Scotia, and is controlled from this station.

Ellerslie, P.E.I. Biological Sub-station.

Associated with the St. Andrews Station, and concerned especially with oyster culture.

Halifax, N.S. Atlantic Fisheries Experimental Station.

Concerned with the handling and preservation of fish for food, and the development of fish products other than food.

Grande Rivière, P.Q. Gaspé Fisheries Experimental Station.

Concerned with the handling and preservation of fish for food, and the development of other fish products.

Pacific Coast

Departure Bay, B.C. Pacific Biological Station.

Field work directed from this station is carried on at numerous places in British Columbia and the adjacent waters.

Cultus Lake, B.C. Biological Sub-Station.

Under direction of the Departure Bay station, and immediately concerned with study of the propagation of sockeye salmon.

McClinton Creek, Queen Charlotte Island, B.C. Biological Sub-station.

Under direction of the Departure Bay station, and particularly concerned with study of the propagation of "pink" salmon.

Prince Rupert, B.C. Pacific Fisheries Experimental Station.

Concerned with the handling and preservation of fish for food and the development of fish products other than food.

For the current year the sum of \$201,300 was voted, and this has been allotted as follows:—

St. Andrews Station and work associated therewith.. . . .	\$ 47,965 03
Halifax Station and work associated therewith.. . . .	39,645 80
Gaspé Station and work associated therewith (8 months only)..	10,000 00
Nanaimo Station and work associated therewith.. . . .	49,284 29
Prince Rupert Station and work associated therewith.. . .	33,160 08
General Account (including the Margaree investigation, and editorial and printing expenses).. . . .	21,244 80

During 1936 steady progress has been made in all of the various problems concerned with the fishing industry and with fish culture in which the scientists of the board are engaged. I desire to draw attention to certain important features of the work.

RESULTS FROM THE BIOLOGICAL STATIONS

ATLANTIC COAST

An experiment has been in progress for the past four years which was designed to ascertain whether it is possible to introduce "early run" Atlantic salmon into streams in which the native salmon only enter in the late summer. In 1932 "early run" Restigouche salmon fry were planted in Apple river, N.S., a river which naturally has only a "late run." No "early run" fish have resulted from this planting, and in fact the progeny have been definitely shown to return to the river late in the season. This result strongly supports the theory that the time of return to a river is subject to environmental rather than to hereditary control. It bears directly on fish cultural policy, since it indicates that it is impossible to produce an early run of salmon in "late run" streams by transferring to them salmon from "early run" streams.

In another experiment designed to secure data for fish cultural policies it was shown, by poisoning the fishes of three Nova Scotian lakes with copper sulphate, that of a population of some 150,000 fish in these lakes well over one-half were potential enemies of trout, and of such size that they would devour any trout fry which might be planted in such lakes. Hence, whenever it is desirable to establish or re-establish more desirable species in such waters, it is essential to remove these enemy fish. The results indicate the importance of possessing an accurate knowledge of the fish population of any body of water before fry planting is attempted.

At the Prince Edward Island Biological Station, which is particularly concerned with oyster culture, alterations in the construction and handling of rearing trays for spat has lowered the cost of rearing oysters as practised in leased areas. An inexpensive preservative has been developed to protect these trays from early destruction by wood borers. Methods have been determined which will induce optimum growth in such tray-reared oysters. In one particular area it was found possible, using these methods, to grow a barrel of oysters with an expenditure of about \$1.50, although it must be pointed out in mentioning such a figure that actual cost will vary in different localities, and possibly also in different years.

Success was attained in locating the early stages of larval lobsters in waters of the gulf of St. Lawrence. They were found to be definitely free-swimming near the surface in the first two stages of development. This field of study is almost unexplored, and the observation opens up the way to studies of survival and growth of these early stages. A method is now available for testing success or failure in breeding lobsters in those sections of the Canadian Atlantic coast where temperature and other conditions seem to be detrimental to successful breeding. Such knowledge of success or failure of reproduction is obviously important in framing methods of conservation.

PACIFIC COAST

Definite progress has been made in the program for the removal of predatory fishes from Cultus lake, in an endeavour thereby to increase the production of young sockeye salmon. Although, so far, only a relatively small proportion of enemy fish has been eliminated, yet the preliminary results indicate that the percentage of sockeye which survives during their year of residence in this lake has been more than doubled.

Following preliminary experiments in previous years on the artificial stimulation of spawning of Japanese oysters in Ladysmith harbour, a large-scale experiment was carried out in 1936. The oysters over a large area were induced to spawn early in the summer. There was exceptionally good spatting, and subsequently rapid growth of the young oysters. In the past in this locality spawning has been uncertain, and when it occurred it was rather limited, and usually late in the year. Following the early spawning induced this year it has been found that the spawned-out oysters return quickly to a condition suitable for marketing. Should the artificial stimulation of spawning prove to be a practical annual procedure, there will result a large financial saving, in that importation of spat from Japan or the United States will be unnecessary.

Through the co-operation of the Department of National Defence in making available a naval vessel definite progress has been made in a study of movements of the ocean waters off the west coast of Vancouver island. These investigations are expected to assist in the elucidation of certain problems related to the migration of such fishes as pilchards, herring, and salmon. The area off the entrance to the strait of Juan de Fuca, has been given particular attention, in view of its relation to the migration of very large numbers of salmon to the Fraser river.

Pilchard migration is being investigated by adopting an ingenious method, developed by American investigators, which consists in the insertion of small nickel-plated iron tags into the body cavity of the fish, and recovering the tags by means of electro-magnets in the meal lines in the reduction plants. It is hoped that by this means information may be obtained concerning the migration of pilchards along the coast. This information is particularly needed, and the program includes a co-operative arrangement with investigators in California. A similar investigation with herring is in progress. Recovery of tags from the herring is made in the salteries by means of an induction detector which separates out fish containing tags through operation of a trap door in the conveyor system. (The apparatus was developed in the laboratories of the University of Washington and has been used successfully by investigators of the United States Bureau of Fisheries).

THE MARGAREE INVESTIGATION

During the past two or three years, at the request of those interested in salmon angling on the Margaree river, Cape Breton, an enquiry has been conducted into the causes for the scarcity of the salmon in that river during the summer angling season in recent years. It had been claimed that excessive numbers of nets on the coast outside the river mouth kept the salmon from entering the river, but facts obtained in 1935 and 1936 show that fish freed from these nets wander sometimes very long distances, up and down the coast, and fail to approach and enter the river until the right conditions are present, and this may not occur for several months. It has been quite clearly demonstrated that the condition at fault in recent years has been a lessened rainfall; the seasons have been unusually dry. The continually accumulating evidence has provided overwhelming proof that a good downpour of rain is the active agent in moving the fish, and that it acts not only in the river proper, but out through the estuary into the sea. For some reason still to be elucidated the fish swim upstream when the current slackens after the freshet due to the downpour. The only

remedy seen for such conditions as have existed recently is to use impounded water for production of artificial freshets whenever natural freshets fail. Such a method might obviously involve considerable expenditure of money.

A second year's study corroborates earlier results that the principal enemies of the young salmon in freshet-swept streams whose chief or sole inhabitants are salmon and trout are kingfishers and mergansers. Steps are being initiated to determine experimentally by actual count whether a significantly greater number of salmon smolts will go to sea from a stream when the birds have been largely eliminated than when they are given unrestricted scope. Such an experiment is essential to exclude the possibility that unknown factors are operating which will offset any advantage that might be obtained by removal of the birds.

RESULTS FROM THE EXPERIMENTAL STATIONS

THE ATLANTIC STATION AT HALIFAX

This station is investigating problems related to methods of increasing the home consumption of fish. Such an increase, it is believed, would have a most important stabilizing influence on the industry. According to the latest available information the yearly per capita consumption of fish in Canada is about 21 pounds, as compared with 40 pounds in Great Britain and 70 pounds in Norway. Further, it would appear that geographical location rather than purchasing power is a chief factor governing consumption of fish in Canada, for, on the average, each family in the Maritime Provinces consumes twelve fish meals per month, while a family in the inland provinces only consumes eight such meals.

The staff of the Halifax Station are endeavouring to ascertain reasons for the relatively low consumption, and since two-thirds of the fish consumed in Canada is so-called fresh, untreated fish, attention has been concentrated on this fresh fish.

Many useful data are being accumulated, and their critical evaluation will enable the industry and government to co-operate to the end that quality can be maintained in fish products until they are consumed. An ingenious and important chemical method has been developed whereby it is now possible for the first time to determine the freshness of fish food products at the time they are offered for sale to the public, or at any prior stage in their handling and distribution. The investigation is still under way, and until it is complete the results obtained to date must await final interpretation. It seems quite probable that the new chemical test, or some modification of it, can be used in similar investigations for detection of the freshness of meat and other flesh foods.

Another research at the Halifax Station has resulted in the development of new ways of preserving "marinated herring", a commodity which has not been exploited in Canada, but for which there would appear to be both an export and a domestic market. Studies on the preparation of salt fish have revealed the rôles that temperature and salt concentration play in the preservation of such fish—an important initial step towards defining storage conditions that will save labour and prevent waste. A new by-product has been produced from fish guts (up till now wasted) in the form of a ferment which promises to be of use in the leather tanning industries, and to replace material that is at present imported.

THE GASPÉ STATION AT GRAND RIVER

Since this station was opened only in August the work so far has been of a preliminary and preparatory nature. A laboratory has been established and equipped for routine work and research. The director has devoted a large part of his time to a survey of the fishing industry around the peninsula, and has attempted to ascertain the chief difficulties at present encountered by the fisher-

men and the industry. He is preparing to offer as soon as possible suitable courses of instruction in the proper handling of fish and in preparation of the various products which can be marketed.

In recent years fresh fish production has continuously increased on this coast, and the program of research which is being initiated will include a study of methods designed to improve the marketing of such fresh fish.

THE PACIFIC STATION AT PRINCE RUPERT

Three investigations that have been in progress for some years have reached the concluding stage. Efforts to introduce a system of overhead cooling in Canadian railway refrigerator cars culminated in a commercial shipment of frozen fish and meat between Vancouver, Winnipeg, and Montreal this summer, in a car partially designed at the station and constructed by the Canadian Pacific Railway. The results conclusively demonstrated its superior performance and economy as compared with the usual type of end-cooled car. Researches designed to demonstrate the suitability of certain British Columbia fish oils for paint manufacturing purposes have eventually led to the general recognition and commercial adoption of these oils (pilchard and some herring oil) as valuable supplements to linseed oil. Four years' investigation of the seasonal variation in the vitamin D content of pilchard oil has disclosed a consistent minimum towards the close of the season (October), with the result that the earlier portion of the season's production is now selected when the oil is desired for commercial use as a supplement in livestock and poultry feeds, added for the prevention of rickets.

Continuous efforts in devising means for maintaining the desirable qualities of fresh and processed fish products have led to trials of the use of an antiseptic ice on fishing vessels, with promising results. An opaque, non-cracking ice glaze for frozen fish, adopted commercially two years ago, has been improved and supplemented by the development of a transparent non-cracking glaze. These developments, together with other information that has been obtained regarding the best rates for freezing, and the most desirable conditions of temperature and protection against discoloration during cold storage and transportation, will now enable a concentrated effort in 1937 towards improvement in the quality of the frozen halibut and salmon that form a very important item in the export trade of British Columbia fish to Great Britain.

Installation of a special instrument for measuring the vitamin A content of fish oils has increased the Station's facilities for extended surveys of British Columbia fishes to find new sources of oils rich in vitamins. Samples of the liver oil from red cod have been found to rival the higher grades of halibut liver oil in vitamin A content. It has been shown that, depending on the age of the fish, the locality of catch, and the season, halibut liver oil may vary 400 per cent in its vitamin A potency. A survey of dogfish liver oil only very recently commenced indicates that the best oil (which is obtained from males, or from pregnant females), frequently is better than medicinal cod liver oil as far as vitamin A content is concerned.

APPENDIX No. 5

REPORT ON OYSTER CULTURE WORK UNDER THE DEPARTMENT
OF FISHERIES FOR THE YEAR 1936-37

BY A. W. H. NEEDLER, PH.D., BIOLOGICAL BOARD OF CANADA

The oyster culture work which the Department of Fisheries has carried on since 1928 principally in Prince Edward Island has recently been extended to Nova Scotia. While the work is, for convenience, reported below according to province, it is made one by the common value of the results of investigations, by common planning and by the use of personnel and other resources in common.

A. PRINCE EDWARD ISLAND

The Dominion Government, by an agreement with the Province of Prince Edward Island in 1928, obtained jurisdiction over its oyster areas and undertook to develop its oyster industry. As the most important step in that direction the establishment of oyster farming was planned in those suitable areas which did not support a valuable public fishery. A review of the earlier course of the program undertaken was given in Appendix No. 6 of the Annual Report of the Department of Fisheries for 1935-36 and need not be repeated here.

I. DEVELOPMENT OF LEASED AREAS

Table I summarizes the development of leased areas, including a number of areas on which work has been carried on at the applicant's risk in advance of the completion of the leases. It is compiled from statements obtained from each oyster farmer and, while complete returns were not always obtainable and the figures are, therefore, sometimes slightly less than the truth, it gives a reliable close approximation.

The table shows the great increase in oyster farming activity in 1936. The increase in the total is attributable to the Malpeque-Cascumpeque region where the conditions are very promising and where the benefits of the experimental farming and other activities of the department have been felt most directly. A heavy mortality of oysters in Hillsborough river (near Charlottetown) and in the neighbouring bays on the north shore of the province has led to an almost complete cessation of oyster farming activity in Rustico, Brackley, Covehead, Tracadie and Savage bays. The table does not include figures for Wolfe inlet where there was considerable activity in the winter of 1936-37 in the improvement of soft bottoms with sand, but the development in the smaller out-lying areas of the province has been relatively small to date. This is believed to be due in part to the more doubtful prospects for success in isolated operations, in part to the greater difficulty in obtaining the benefits of the department's work, and in part, of course, to the more recent development of the interest in oyster culture.

TABLE 1.—SUMMARIZING THE DEVELOPMENT OF AREAS UNDER CULTIVATION IN PRINCE EDWARD ISLAND IN 1936

Region	Year	Number of areas under cultivation	Approximate total area	Oysters planted	Oysters sold	Shells used for spat collection	Cardboard spat collectors
			(acres)	(bbl.)	(bbl.)	(bu.)	(No.)
Malpeque (including Narrows to Rocky point and tributary inlets).†	1932	26	110	254	0	1,500	0
	1933	45	195	918	181	1,600	0
	1934	81	367	1,093	401	1,000	1,190
	1935	92	414	1,035	894	575	3,350
	1936	176	789	2,695	997	536	13,000
Narrows (Rocky point to Cascumpeque bay).	1935	4	17	90	0	70	0
	1936	20	46	335	8	475	430
Cascumpeque (Foxley river).....	1933	2	8	17	0	0	0
	1934	4	20½	423	33	50	64
	1935	5	21½	178	85	0	0
	1936	6	27	311½	88	0	125
Total. Malpeque-Cascumpeque region.	1932	26	110	254	0	1,500	0
	1933	47	203	935	181	1,600	0
	1934	85	388	1,516	434	1,050	1,254
	1935	101	453	1,303	979	645	3,350
	1936	202	862	3,342	1,093	1,011	13,600
Rustico.....	1934	1	5½	100	0	0	0
	1935	3	16½	145	5	15	0
	1936	4	22	10	0	30	120
Brackley-Covehead.....	1933	6	33	370½	50½	300	0
	1934	8	44	343½	92½	2,500	0
	1935	13	61	248½	140½	800	0
	1936	13	61	0	0	900	0
Tracadie.....	1934	1	5½	50	0	0	0
	1935	5	20½	200	0	0	0
	1936	7	26	0	0	0	0
Savage.....	1933	3	8	58	0	100	0
	1934	3	8	102	0	150	0
	1935	5	19	157	0	3,500	0
	1936	5	19	28	1	0	320
Total. Rustico to Savage.....	1933	9	41	428	50	400	0
	1934	13	63	595	92	2,650	0
	1935	26	116½	750	145	4,300	0
	1936	29	128½	38	1	950	440
Pinette.....	1935	10	15	126	0	Some	0
	1936	11	17	47	3	Some	0
Brudenell river.....	1935	1	1	10	0	0	0
	1936	1	1	6	0	0	0
Grand Total.....	1932	26	110	254	0	1,500	0
	1933	56	244	1,363	231	2,000	0
	1934	98	451	2,111	526	3,700	1,254
	1935	138	585½	2,189	1,124	5,000	3,350
	1936	243	1,008				

† Deeded area of G. S. Sharp *et al.* included except in number of areas under cultivation and acreage. In 1936 33½ bbls. were planted on this area and 85 bbls. fished from it.

‡ Not including oysters planted in part of the season only and taken up again for market. The table is not wholly complete. Through unavoidable omission of some items which were not available the figures will in some instances be lower than the truth. The areas given are approximate total acreages of holdings any part of which are under cultivation. It is impossible to estimate the actual area in use.

Malpeque-Cascumpeque Region.—Additional information on the private oyster farming in the Malpeque-Cascumpeque region is given in Table 2. The total expenditure in 1936 in connection with the development of private areas was over \$19,000. This was more than three times that in 1935. In spite of an exceptionally cold season which reduced the growth of the oysters, the yield showed an increase which would have been much greater in a normal year. The expenditure was more than double the value of the oysters sold, indicating the great effort which is being made to increase the yield. The quantities of oysters planted are far in excess of those taken for the market and there is no tendency on the part of lessees to deplete their areas. The oyster farming industry as a whole is spending now to build up a high production in the future. There are indications of continued expansion in 1937.

TABLE 2.—OYSTER FARMING IN THE MALPEQUE-CASCUMPEQUE REGION IN 1935 AND 1936

	1935	1936
Number of areas under cultivation.....	101	202
Barrels of oysters planted.....	1,303	3,342
Barrels of oysters sold.....	979	1,093
Cardboard spat collectors used.....	3,350	13,600
Wages paid for development of areas.....	\$ 2,137	\$ 6,077
Money spent for materials used in development.....	\$ 1,665	\$ 7,351
Days' work by lessees.....	1,126	3,321
Value of time spent by lessees at \$1.75 per day.....	\$ 1,971	\$ 5,812
Estimated total value of work and materials used in development.....	\$ 5,773	\$ 19,240

As the returns could not be made entirely complete the figures are conservative approximations. Rentals paid to the department are not included.

It is impossible to give adequate figures for many aspects of the development work which is being carried on such as, for example, cleaning and hardening of ground, removal of mussels or starfish, separation of clusters, spat collection through cleaning at the proper time, transfers of oysters from producing and growing grounds to maturing grounds, etc. In these ways much sound and effective work is being done. Table 2 does show, however, the increase in the use of concrete-coated cardboard collectors to obtain spat to be reared on trays. In 1936 over 3,000,000 separate 1935 spat were reared on trays. Owing to the exceptionally cold summer of 1936 the "set" obtained was poor and late, and growth of both newly-settled spat and 1935 spat on trays was relatively slow. As the cold summer also favoured the survival of starfish the conditions in 1936 for the production of small oysters were unusually poor. On the other hand, "sets" in 1934 and 1935 and relatively good survival in the succeeding winters produced large quantities of small oysters in shallow water to be picked and planted in 1936. Severe mortality along the shores in the winter of 1936-37 and the poor "set" in the summer of 1936 make the immediate future prospects for this source of planting stock poor. It is expected that as the industry expands the relative importance of the picking of naturally produced small oysters along the shores will decline, as compared with greatly increased spat collection operations.

Table 3 summarizes the production of oysters in the Malpeque-Cascumpeque region during the past four years. Growth of oysters during 1936 was small, probably because of the cold summer, and it is believed that this has made the yield less than it would otherwise have been.

TABLE 3.—PRODUCTION OF OYSTERS IN THE MALPEQUE-CASCUMPEQUE REGION

Year	From the Department's Areas	From Private Areas	Total
	bbls.	bbls.	bbls.
1933.....	327	181	508
1934.....	422	434	856
1935.....	332	979	1,311
1936.....	454	1,093	1,547

Mortality in Hillsborough River and Neighbouring North Shore Bays.—A very serious mortality of oysters occurred during 1936 in Hillsborough river (a tributary of Charlottetown harbour) and in Brackley bay. An area in Hillsborough river formerly supporting a fishery of some thousands of barrels

produced no commercial catches at all in the autumn of 1936 and the mortality in Brackley bay appears to have been of the same order. Mortalities also occurred in Tracadie and Savage bays and it seems probable that the stocks will be largely destroyed in all the bays from Rustico to Savage in which oysters from Hillsborough river have been planted in the past two or three years. As a result, oyster farming has practically ceased in these inlets. The fishery and other observations in Hillsborough river and the activities of the oyster farmers in the north shore bays indicate that, although some losses may have occurred late in 1935, the mortality was chiefly in the late summer of 1936.

The mortality was too complete to be attributable to overfishing, shifting of bottoms, starfish or other common normal causes of death among oysters, and there is no indication of any abnormal hydrographic conditions. An epidemic disease is the only explanation which appears acceptable. In view of the large quantities of oysters transferred from Hillsborough river to leased grounds in the neighbouring north shore bays in recent years, it is reasonable to suppose that if a disease is responsible it is probably the same one in all these inlets.

There is evidence that the micro-organism responsible for the epidemic which destroyed the fishery in the Malpeque-Casumpeque region commencing in 1915, is still in that region although the present oyster population there is resistant. That disease may have been carried to Hillsborough river incidentally by the movements of fishermen and transferred to the north shore bays with oysters to be planted on leased areas; and this is the only source of such a disease definitely in view. Investigations are planned for 1937 to determine, if possible, the nature and cause of the disease and whether it is the same as that in the Malpeque-Casumpeque region. If the latter is the case Malpeque stock, which is resistant, might be used to advantage to re-establish oysters in the affected inlets. A knowledge of the disease is necessary to provide a sound basis for future oyster culture policies in these inlets and others which may be affected.

Oyster farming activity in the north shore bays from Rustico to Savage was affected in 1936 by early indications of the mortality and cannot be expected again until investigations provide a basis for re-establishing the industry there.

II. EXPERIMENTAL FARMING AND PROVISION OF STOCK

Experimental farming in close co-operation with the investigations by the Biological Board has been carried on in Bideford river (tributary to Malpeque bay) where areas have been set aside for that purpose and where the board has established the Prince Edward Island Biological Station at Ellerslie. The scientific investigations by the board have been designed to develop cultural methods and to provide a sound basis of knowledge for the administration and development of the industry. The department has carried out larger scale trials of methods based on and followed by the scientific investigations, and it has made an effort to provide "seed" stock to oyster farmers.

The great development of the oyster farming industry in the Malpeque-Casumpeque region in 1936 has been shown above and a continually increasing interest promises further advances in the future. Every effort must be made to meet the growing demand for planting stock and to facilitate the expansion. The development of further improvements in oyster cultural methods and their demonstration to the industry must be continued. Our knowledge of the oysters and the conditions affecting their growth and reproduction must be made to keep pace with the growing and changing industry. These are the aims of the experimental farming and related operations.

While maintaining headquarters for the work as a whole at Ellerslie, the special needs of other localities are being borne in mind. Many of the results obtained at this central experimental farm are applicable to other localities with minor variations or none, but investigations, demonstrations, or operations for the provision of stock are carried out elsewhere to meet special local needs as they arise. It is pointed out, however, that the extension of the work to small outlying areas is limited by expense and by availability of the trained personnel necessary for proper supervision.

Provision of Planting Stock in the Malpeque-Cascumpeque Region.—In 1936 a total of 296 barrels of two-to-three-inch oysters was sold to lessees for stocking purposes from the department's areas in Bideford river, an increase of 28 barrels over 1935. There is a continually increasing demand for these oysters and sales are limited by the supply. The price was continued at \$2.50 per barrel.

There has been an alternative source of planting stock in the department's policy of issuing permits to lessees to pick oysters for that purpose in the shallow shore zone where winter mortality is high. The policy has led to the transfer of large quantities of oysters from the shallow water into deeper water, thereby saving them from the winter killing which would otherwise have destroyed a large proportion. In 1934 about 975 barrels were picked in this way, and in 1935, in spite of an increased demand, only about 850 barrels. In 1936 owing to good "sets" in 1934 and 1935 and to good survival in the following winters about 2,600 barrels were picked. Heavy mortality along the shore in the winter of 1936-37 and a poor "set" in 1936 promise only small quantities in 1937. The supply for picking depends on the natural settling of spat and is, accordingly, subject to great variations from year to year and cannot be expected to increase in proportion with the demand.

During the year 2,872 concrete-coated egg-crate fillers each bearing over a thousand 1935 spat suitable for rearing on trays were sold. The demand for small stock for rearing was so strong that these were supplemented by the sale of 40,000 single spat from collectors (1935 "set") and by the sale of 21 barrels of partially reared 1935 spat. In 1936 there was a great increase in efforts by lessees to collect their own spat for rearing, as has been noted above, but the demand for spat remained so great that it was deemed advisable to continue the production of spat for sale. With this end in view about 6,000 cardboard collectors were put out by the department, but, owing apparently to the exceptionally cold summer, the "set" was poor and late. The sale of spat is carried on by the department in order to introduce the method to the industry and to enable new participants to commence production of planting stock without unnecessary delay. It is anticipated that private operations will supply all the industry's requirements in the near future.

Revenue.—Table 4 summarizes the revenue from experimental farming and provision of planting stock in 1936. Sales of small oysters and spat have been mentioned above. In 1936 the department sold from its experimental farming 454 barrels of market oysters at an average price of \$6.41 per barrel, as compared with 331.7 barrels at an average price of \$4.81 in 1935.

The total revenue from oyster culture operations, exclusive of rentals on leased areas, was \$4,362.30 in 1936 and all came from the Malpeque-Cascumpeque region. The addition of the rentals makes the total revenue from the department's oyster culture operations in 1936 about \$5,000, all of which was from Prince Edward Island.

TABLE 4.—REVENUE FROM EXPERIMENTAL FARMING AND PROVISION OF PLANTING STOCK IN 1936-37

	1936-37	cf. 1935-36
	\$ cts.	\$ cts.
Sale of 2,872 cardboard spat collectors bearing spat at \$0.15.....	430 80	121 65
Sale of 40,000 spat from collectors at \$0.25 per M.....	10 00	.....
Sale of 21 bbls. small reared spat from trays at \$12.00.....	252 00	.....
Sale of 296 bbls. small oysters for planting at \$2.50.....	740 00	670 50
Sale of oysters dredged in Hillsborough river for planting in Rustico to Savage bays.....	.....	454 00
Sale of market oysters from experimental farm—		
277 bbls. ordinary at \$5.50 (\$4.00 in 1935-36).....	1,523 50	929 20
122 bbls. "medium" at \$6.75 (\$5.00 in 1935-36).....	823 50	267 00
55 bbls. "select" at \$10.25 (\$9.00 in 1935-36).....	563 75	414 00
Sale of 1½ bbls. 3-inch cup oysters for samples to England at \$12.00.....	18 00	.....
Sale of empty barrels.....	.....	29 25
Sale of wire containers for spat collectors.....	.....	5 60
Rent of starfish mops.....	0 75	.....
Total.....	4,362 30	2,891 20

Results of Investigations and Experiments to Improve Cultural Methods.—

The results of investigations and experiments to develop improvements of oyster cultural methods and extend our knowledge of the biology of the oyster are reported in detail elsewhere and space does not permit any complete account here. It is possible only to mention briefly some aspects of this work in 1936.

Efforts to develop cheaper modifications of the method of rearing small oysters on trays included trials with various substitutes for the galvanized wire cloth used for the bottoms of the trays. The coarse, strong, open-meshed sacking of the bags in which coffee is imported was satisfactory when first put in the water but soon rotted. Treatment with a mixture of tar, benzol and copper oleate lengthened the life of the sacking but even then it could not be relied on for a whole season. Other lighter open-meshed sacking was even less satisfactory. Although the treated sacking might be of use for rearing spat which falls through the wire cloth, its life is so short that the expense would be great and board bottoms are more promising for that purpose. Trays with board bottoms, covers and side and wire netting ends were found suitable for rearing very small spat and gave satisfactory growth unless crowded. The wood ($\frac{1}{2}$ -inch rough spruce) is cheaper even than the sacking (about $\frac{3}{4}$ cents per square foot as compared with about 1 cent). With the development of a cheap protection against shipworms trays with board bottoms promise well. It is planned to improve the circulation by making similar trays deeper than those tried in 1936. Hexagonal galvanized netting coarser than the $\frac{1}{4}$ -inch mesh wire cloth is being tried for the larger spat. The degree of saving will be determined by the length of life which is expected to be longer than that of the wire cloth.

Experiments with higher concentrations of spat in the trays indicated definitely that poor results are obtained by rearing more than 200 per square foot on the wire bottom trays. The mortality remains low but the growth is much slower and the proportion reaching maximum size is smaller.

Oysters, from trays, smaller than $1\frac{1}{2}$ inches have been planted in a variety of situations. While the final results will not be in evidence for some time, present indications are that nothing smaller than $1\frac{1}{2}$ inches long should be planted even in mid-summer, except on selected grounds (usually shallow) where starfish are absent or can be completely removed. In such situations wavewash, growth of algae and other factors vary a great deal but certain grounds can be used satisfactorily for rearing very small oysters and do then provide the cheapest method.

The use of shores near low-tide level for rearing spat on shells has been continued. If starfish are kept off, the results are good and some of those left behind in the autumn survive the winter.

The protection of wood against shipworms is very important to oyster growers. Wooden trays, floats, buoys, etc., may be completely destroyed in less than a month if exposed when the shipworm larvae are settling. A cheap effective protection has, therefore, been sought in experiments in 1936. Copper paint has been used hitherto with good results but is expensive (about \$4 per gallon) especially as experience shows that it requires for best results a surface already planed and painted.

Creosote was shown in 1935 to be ineffective if applied with a brush or by dipping cold. In 1936 trays built of lumber treated under pressure to retain 16 pounds of creosote per cubic foot were completely unharmed although trays of untreated wood were completely destroyed with an incidence of over 100 shipworms per square inch on much of the surface. The creosote greatly reduces the buoyancy of the wood, making extra support for the trays necessary, and the initial cost is high. On the other hand the protection is the most complete of any method tried, as the worms cannot enter through chafed spots, and the expense may not prove great in the long run.

Experiments indicated that if trays made of untreated wood are removed for three days every ten days the shipworms enter the wood but do not grow large enough to do serious damage before being killed by the exposure. With rearing trays this would require about 30 per cent extra equipment but may be the cheapest way for those to whom labour and lumber are cheap, especially if board-bottom trays are used. The method cannot be applied conveniently to floats bearing cardboard collectors.

A mixture of tar, benzol and copper oleate, developed by Taylor and Wells as a net preservative some years ago, was tried. A pound of copper oleate was dissolved in half a gallon of benzol and mixed with a gallon of light tar. The mixture costs less than fifty cents per gallon and, when applied cold with a brush, covers as much surface as copper paint. It gave about the same protection—i.e., worms entered only where the coating had worn off—and may provide the cheapest effective method when improved by further experiments.

Field Day for Prince Edward Island Oyster Growers' Association.—A field day was held at the biological station at Ellerslie on August 26th in co-operation with the Prince Edward Island Oyster Growers' Association. Exhibits were arranged illustrating many aspects of the oyster farming industry and the biology of the oyster, and the meeting of the association was featured by addresses on the industry, the principal of which was by Dr. W. A. Found, Deputy Minister of Fisheries. The general public was invited and the attendance was large. The field day seemed so valuable in creating interest in oyster culture and disseminating information about it that a repetition is planned in 1937.

B. NOVA SCOTIA

In 1936 the Dominion Government entered into an agreement with the Province of Nova Scotia similar to that made with Prince Edward Island in 1928. Jurisdiction over the oyster areas of the province was transferred to the Dominion which undertook development of the industry.

The present oyster areas of the province are found in the Bras d'Or "lakes" of Cape Breton island and along the coast of Northumberland strait. The production is much larger in the former than in the latter and the conditions in the two regions differ widely.

Hardly any effort to cultivate oysters has yet been made in the province and the potentialities of the industry are much greater than its present development indicates. Sound expansion can be based only on a thorough knowledge of the conditions and investigations to provide this are now under way.

Bras d'Or Lakes.—A preliminary survey of conditions in the oyster areas of the Bras d'Or lakes was made in 1934 and some minor supplementary investigations were carried on in 1935. In 1936 intensive investigations were commenced which included experimental collection of spat and a much more detailed survey of conditions generally in the "lakes."

The region presents special conditions which are widely different from those in Prince Edward Island which have been studied more closely hitherto. Principal among these is the prevailing low salinity with accompanying "fresh" flavour of the oysters and relatively soft shells. The problems of the industry here will be greatly concerned with the quality of the oysters produced as well as with the quantity.

Experiments in 1936 in the production of spat met with good success and it is not believed that the industry will be limited by this essential step. The region abounds in well sheltered inlets which support most of the present oyster population and where the conditions appear to be excellent for spat production. It is believed that little effort would be needed to supply seed stock for a much larger industry.

While repeating spat production experiments on a somewhat larger scale, it is planned in 1937 to extend investigations to the rearing of small oysters and to improvement of quality. Experimental plots on which to study and demonstrate methods of producing oysters, with special attention to quality, are to be established in the Bras d'Or lakes, and the transfer of oysters to saltier areas outside will be tried.

The region now supports a public fishery concentrated in the vicinity of Denys basin and the western part of St. Patricks channel, and scattered through the same area, which presents the best prospects for the industry, are a number of leases formerly issued by the provincial governments. Oyster farming can probably both increase the production and improve the quality and it is only through oyster farming that there is any prospect of a sustained expansion of the industry. Although administrative problems are involved, it is believed that it can be encouraged in the region without seriously affecting the public fishery.

Northumberland Strait Oyster Areas.—A brief preliminary survey of conditions in the oyster areas of the "Gulf shore" of Nova Scotia was made in 1936 to provide a basis for planning further investigations there. The production of recent years in this region has averaged somewhat less than 1,000 barrels annually with the greatest yields at Wallace, Tatamagouche and Caribou in that order.

The conditions in the various inlets differ widely. At Pugwash river oysters are fished in the upper part of the channel where low salinities and soft bottom lead to poor quality. At Wallace oysters are fished in the lower parts of the channel of the Wallace river estuary proper and also in the Northwest branch; some oysters are picked at low tide. The salinities are reasonably high, the quality of some of the oysters very good and there are some barren, hard bottoms at a sufficient depth to escape ice. At Tatamagouche bay, of which Malagash bay is a part, most of the oysters are picked at low tide and the presence of any considerable area of deep, firm bottom suitable for oyster culture is problematical. At Caribou harbour deep, firm bottom seems to be limited and picking at low tide plays a considerable part. At Merigomish most of the oysters are picked on flats in small sheltered inlets at the head of the bay. At Tracadie most of the oysters are raked on ground covered at low tide which is limited in area.

Certain problems require investigation before any sound development is possible. The conditions in estuaries having a considerable inflow of fresh water and on tidal flats, which play such an important part in the natural production, require study. It is proposed to start intensive investigations in the Wallace-Malagash district which presents the best variety of conditions, the largest present industry and, for the present at least, the best prospects for development. In addition to a general survey of conditions and trial spat collection, special attention will be given to tidal flats. In a region where there is an apparent scarcity of suitable deep ground it is important to develop an improved technique in the exploitation of the flats which might include the use of low dykes to retain shallow pools. Further exploration is planned in other inlets.

C. NEW BRUNSWICK

Pending completion of the examination of Shediac bay by the Department of Pensions and National Health no further work was done there in 1936. The work by the Biological Board and the Department of Fisheries in this area in 1932 and 1933 has served to bring some of its special problems to light, particularly the erratic local production of spat, and to provide a basis for attack on them when a decision regarding public health policy is reached.

APPENDIX No. 6

INSPECTION OF CANNED SALMON

ANNUAL REPORT OF F. CHARNLEY, CHIEF CHEMIST, CANNED SALMON INSPECTION LABORATORY, VANCOUVER, B.C.

In 1935 it was decided to replace the Board of Canned Salmon Inspection, which had been established in 1932, by officers having scientific training who would carry out inspections of canned salmon in a suitably equipped Inspection Laboratory to be conducted by the department. The chemist in charge of the Canned Salmon Inspection Laboratory was appointed in October, 1935, while the two other inspectors, who together with the Chief Chemist form the staff of the laboratory, were appointed in January, 1936. These officers took over the work of inspecting canned salmon in British Columbia on April 1st, 1936.

Before taking over from the Inspection Board the members of the staff of the Inspection Laboratory made numerous visits to the premises of the local salmon inspectors and to the laboratories of the National Cannery Association in Seattle. Some opportunity was also afforded the new officers of acquainting themselves with the methods of inspection followed by the United States Food and Drug Administration Bureau. From these visits and from a survey of the literature pertaining to the inspection of canned fish foods, it was possible, by making use of certain results of recent statistical research, to set up a tentative system of inspecting canned salmon embodying the latest advances along these lines.

GENERAL BASIS OF PRESENT SYSTEM OF INSPECTION

In establishing the present system of inspection the general aim has been to place the grading of canned salmon, as far as possible, on a purely objective basis. A program of routine tests and research has been adopted leading towards the general goal of maximal objectivity with minimal subjectivity, that is, the replacement, as far as feasible, of subjective estimates of quality with objective estimates based on quantitative data.

ROUTINE TESTS OF QUALITY

For purposes of routine grading the following quality characteristics of canned salmon are measured: (a) net weight; (b) vacuum; (c) softness (or firmness); (d) volume of free oil; (e) volume of liquor; (f) colour (red and yellow); and (g) pH of liquor (where time permits).

In addition to these quantitative tests a record is made of certain characteristics which are not readily amenable to quantitative measurement. Examples of these are odour, reddening of the flesh, bruises, pugh marks and water marking. With the exception of pH of the liquor, no quantitative tests yielding information as to incipient deterioration of the salmon prior to canning have yet been applied but it is the intention to introduce certain tests of this type during the coming season.

TOLERANCES

Work is at present in progress on the data collected during the 1936 season with the object of establishing tolerances for the various quality characteristics of canned salmon which have been measured quantitatively. These tolerances

will be specified both as regards species and grade, and will refer to the following quality characteristics of canned salmon: (a) net weight; (b) vacuum; (c) softness (or firmness); (d) volume of free oil; (e) volume of liquor; (f) colour (red and yellow); (g) number of stale cans; (h) number of tainted cans; and (i) number of watermarked samples.

Obviously, such limits cannot be set up arbitrarily but must be based on the data gathered during the past fishing season, bearing in mind certain economic considerations and limitations of the salmon canning industry. Such methods cannot fail to have beneficial effects on this industry, for, in addition to eliminating all possibility of unfairness or partiality in the grading, these methods will, in the long run, be advantageous to both the consumer and the producer. The probability of the occurrence of a defective sample, or the "consumer's risk," can be reduced to an economic minimum. The cannery operator, on the other hand, will be in the happy position of knowing exactly what requirements his product will have to fulfil in order to obtain a given grading. With a system of specific, concrete specifications to guide him he will be able to reduce his main problem of producing salmon of grade A quality to a number of simpler problems corresponding to each specification. In addition, the cannery operator will be able to follow variations in any given quality characteristic quantitatively and will thus be in possession of powerful means of discovering and eliminating sources of trouble throughout the various stages of the canning process.

SAMPLING SCALE

Work on the problem of setting up a scientific sampling scale is also in progress at the laboratory. During the past season the laboratory has followed the sampling scale provided by the regulations except in the case of parcels up to and including 25 cases. For parcels of the latter size six cans, instead of the three provided by the regulations, have been drawn, since a preliminary study of this problem shows that it would not be possible to form other than a very rough estimate of the quality of a parcel from an examination of only three cans. In the case of large parcels (1,000 cases or over) the present sampling scale would appear to provide a somewhat more thorough examination than necessary, when compared with the amount of inspection specified for smaller parcels of from 50 to 100 cases.

Averages and standard deviations corresponding to the various quality characteristics, together with the functional forms of these quality characteristics, are now available. In the case of large parcels it will thus be possible to calculate sampling limits for averages and standard deviations corresponding to a given degree of certainty or confidence. The results of comparatively recent statistical research will also enable such sampling limits to be set up in the case of small parcels.

OTHER PROBLEMS

During the winter season a further investigation of the problem of measuring softness (or firmness) of canned salmon has been carried out. A study of the data obtained in this investigation is now under way with a view to establishing the measurement of this quality characteristic on a sound theoretical basis. These researches, it is expected, will result in a new scale for softness (or firmness). A tentative scale which has been derived from these data practically eliminates the skewness occurring in distributions expressed in the old scale, thus making it possible to apply certain results of recent statistical research in calculating a reliable sampling scale for this quality characteristic.

A preliminary investigation of the significance of the pH value of the liquor in canned salmon indicates that this test will yield valuable information concerning the extent of any incipient deterioration in salmon prior to canning.

It is the intention, during the coming season, to continue this work with the object of correlating this test with the trimethylamine test recently developed by the Halifax station of the Biological Board of Canada.

A study of the effect of the time elapsing between the dates of packing and inspection on the free oil content of canned salmon has also been made. This factor has been shown to have, at most, only a negligible effect on the free oil content of canned salmon during the interval between about one week and six weeks after packing.

PUBLICATIONS

The following publications, based on investigations carried out at the Inspection Laboratory, have appeared during 1936:—

Charnley, F.—*Softness of Canned Salmon.*

Progress Report Pacific Fisheries Experimental Station 28.

Charnley, F.—*Colour in Canned Salmon.*

Prog. Rep. Pac. Fish. Expl. Stn. 29.

Charnley, F.—*The Free Oil Content of Canned Salmon.*

Prog. Rep. Pac. Fish. Expl. Stn. 30.

APPENDIX No. 7

SUMMARY OF EXPENDITURE AND REVENUE, BY PROVINCES, OF
THE FISHERIES SERVICE, 1867 TO 1936-37, UNDER THE
DOMINION GOVERNMENT

	Expenditure	Revenue
	\$ cts.	\$ cts.
Nova Scotia.....	7,138,080 43	437,632 67
Prince Edward Island.....	1,155,785 58	134,163 35
New Brunswick.....	5,118,142 72	653,020 85
Quebec.....	2,535,583 57	342,650 10
Ontario.....	3,343,680 17	520,237 81
Manitoba and Northwest Territories.....	23,414 29	4,779 25
Manitoba.....	1,763,968 84	334,589 81
Northwest Territories.....	58,258 58	9,785 23
Alberta.....	518,261 96	226,736 41
Saskatchewan.....	575,983 42	101,945 16
British Columbia.....	15,915,728 22	2,858,183 40
Yukon.....	29,343 94	14,712 75
Hudson Bay District.....		821 82
	38,176,231 72	5,639,258 62
Cruisers, N.S., P. E. I., N. B.....	6,091,664 12	
Expenditure, General.....	5,573,224 41	
Fishing Bounty.....	8,708,282 81	
	58,549,403 06	

FINANCIAL STATEMENT, 1936-37

Vote No.	Appropriation	Amount	Expenditure
		\$ cts.	\$ cts.
145 and 489	(Salaries and disbursements fishery officers.....)	918,600 00	465,264 05
	Fisheries Patrol Service.....		231,318 14
	Fisheries Protection Service.....		189,391 57
146 and 486	Building fishways, etc.....	4,400 00	885,973 76
147	Conservation and development of deep sea fisheries, etc.....	58,600 00	3,636 98
148	Fish culture.....	240,000 00	43,030 43
149	Oyster culture.....	16,000 00	214,528 63
150	International Fisheries Commission (Halibut).....	25,000 00	15,729 46
151 and 487	Biological Board of Canada.....	201,300 00	24,868 03
488	Bounty for destruction of harbour seals.....	15,000 00	196,403 17
Spec. Supp.	To aid in co-operation with Provincial Governments concerned		5,941 50
314	in re-establishment of needy fishermen.....	300,000 00	
Spec. Supp.	To aid in expanding the sale of the products of Canadian fisher-		
315	men in foreign and domestic markets.....	170,000 00	200,007 73
		1,948,900 00	142,764 15
8	Civil Government salaries.....	113,331 00	1,737,883 84
8	Civil Government contingencies.....	20,000 00	107,541 33
Statutory	Fishing bounty.....	160,000 00	17,919 05
Statutory	Minister's salary.....	9,500 00	159,977 75
Statutory	Gratuities.....	560 00	9,499 92
		2,252,291 00	560 00
	ASSET—"Special Account United States Government <i>re</i> Halibut Treaty"		
	Balance due Canada on divisible expenditure for the fiscal year 1936-37.....		3,509 75
			2,036,891 64

FISHERIES
STATEMENT OF REVENUE RECEIVED DURING THE FISCAL YEAR 1936-37

Class	Total	General Account	Nova Scotia	Prince Edward Island	New Brunswick	Quebec	British Columbia	Yukon	N.W.T.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Fisheries revenue.....	55,661 42		12,092 50	1,768 84	10,102 50	307 50	30,895 08	485 00	10 00
Fines and forfeitures.....	6,679 04		410 35	355 50	1,126 66	29 00	4,757 53		
Casual revenue.....	9,174 27		3,099 48	4,426 88	49 15	56 98	540 09		
Fish culture revenue.....	1,444 64	1,001 69		1,425 14					
Modus vivendi.....	282 00		97 00						
Pelagic sealing revenue.....	103,494 19	103,494 19					185 00		
Premium, discount and exchange.....	0 46			0 45					
	176,736 02	104,495 88	15,699 33	7,976 81	11,278 31	393 48	36,397 21	485 00	10 00
Refund of fees received prior to 1936-37. (Fish. Rev.—B.C.).....	6 00								
	176,730 02								

SALARIES AND DISBURSEMENTS OF FISHERIES OFFICERS EXPENDITURES 1936-37, AND SUMMARY

Nova Scotia—

Head Office .. .	\$ 23,574 85
District No. 1 .. .	39,345 14
District No. 2 .. .	49,000 10
District No. 3 .. .	49,985 24
	<hr/>
	\$161,905 33

Prince Edward Island—

District No. 1	\$ 20,176 85	
District No. 2 (Mag'n. Is. Que.)	5,875 64	
	<hr/>	\$ 26,052 49

New Brunswick—

District No. 1	\$ 27,703 71
District No. 2	51,697 04
District No. 3	29,275 59
	<hr/> \$108,676 34

<i>Lobster and Smelt Investigation</i>	5,752 15
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<i>General East</i>	10,232 87
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British Columbia—

Head Office	\$ 26,509 29
District No. 1	35,388 24
District No. 2	32,314 30
District No 3	39,673 29

<i>Canned Salmon Inspection</i>	\$ 11,104 48
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General West	7,655 27	\$152,644 87
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\$465,264 05

SUMMARY

Nova Scotia	\$166,080	96
Prince Edward Island	23,005	21
New Brunswick	117,210	31
Quebec	6,322	70
British Columbia	152,644	87
	<u>\$465,264</u>	<u>05</u>

FISHERIES PATROL SERVICE--EXPENDITURE 1936-37, AND SUMMARY

<i>Nova Scotia—</i>		
District No. 2—		
Department Boats	\$ 11,555 60	
Chartered Boats	3,757 65	
District No. 3—		
Department Boats	17,881 97	
Chartered Boats	961 95	
		\$ 34,157 17
<i>Prince Edward Island—</i>		
Department Boats	\$ 2,079 32	
Chartered Boats	5,973 09	
		\$ 8,052 41
<i>New Brunswick—</i>		
District No.1—		
Department Boats	\$ 16,553 97	
District No. 2—		
Department Boats	1,630 75	
Chartered Boats	18,192 22	
		\$ 36,376 94
<i>British Columbia—</i>		
General Account	\$ 2,610 96	
Digby Island	4,980 31	
Poplar Island	1,944 85	
Air Patrol	16,444 66	
District No. 1—		
Department Boats	18,111 02	
Chartered Boats	—	
General	172 63	
District No 2—		
Department Boats	32,036 32	
Chartered Boats	29,783 54	
General	267 63	
District No 3—		
Department Boats	17,450 98	
Chartered Boats	28,928 72	
General	—	
		\$152,731 62
		\$231,318 14
SUMMARY		
Nova Scotia	\$ 34,157 17	
Prince Edward Island	8,052 41	
New Brunswick	36,376 94	
British Columbia	\$152,731 62	
		\$231,318 14

FISHERIES PROTECTION SERVICE—EXPENDITURES SUMMARY FOR 1936-37

East Coast	\$ 78,647 04
West Coast	110,744 53
	\$189,391 57

FISH CULTURE EXPENDITURE 1936-37 AND SUMMARY

	Personal Services	Other Outlay	Total by Hatcheries	Total by Provinces
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
<i>Nova Scotia—</i>				
Antigonish.....	8,358 53	10,635 57	18,994 10	
Bedford.....	3,882 90	3,509 28	7,392 18	
Cobequid.....	8,089 70	9,039 40	17,129 10	
Coldbrook Ponds.....				
Grand Lake Ponds.....	664 80	414 48	1,079 29	
Lindlof.....	802 00	1,871 53	2,673 53	
Margaree.....	5,688 40	6,166 16	11,854 56	
Margaree Ponds.....	1,126 76	1,014 42	2,141 18	
Middleton.....	3,628 83	3,102 11	6,730 94	
Middlebrook Ponds.....	5,288 40	3,451 63	8,740 03	
Nictaux Pond.....	1,254 23	414 95	1,669 18	
River Phillip Ponds.....	602 10	253 28	855 38	
Sackville River Pond.....	310 50	37 20	347 70	
Yarmouth.....	5,506 20	5,021 61	10,527 81	
	45,203 35	44,931 62		90,134 97
<i>Prince Edward Island—</i>				
Kelly's Pond.....	4,157 70	2,076 05	6,233 75	
Morrell River Pond.....	392 65	115 66	508 31	
	4,550 35	2,191 71		6,742 06
<i>New Brunswick—</i>				
Florenceville.....	4,264 10	4,960 01	9,224 11	
Grand Falls.....	4,682 35	6,373 49	11,055 84	
Miramichi.....	5,173 85	4,151 34	9,325 19	
Miramichi Pond.....	1,001 70	439 18	1,440 88	
New Mills Pond.....	2,132 38	1,721 89	3,854 27	
Restigouche.....	3,571 50	1,687 17	5,258 67	
St. John.....	6,967 50	4,289 10	11,256 60	
St. John Pond.....	1,932 10	5,059 55	6,991 65	
	29,725 48	28,681 73		58,407 21
Supervisor, Engineers and Staff.....	5,232 00	1,296 89	6,528 89	
				6,528 89
<i>General Account—East—</i>				
Chamcook Lake, N.S.....	87 00	69 18	156 18	
Lake Ainslie Survey, N.S.....	32 40		32 40	
Margaree Salmon Investigation, N.S.....	14 80	452 83	467 63	
Nipisquit, N.B.....	18 39		18 39	
Telford & Boar Back Lakes, N.S.....	13 00	20 50	33 50	
Wittenburg Rearing Pond, N.S.....		25 00	25 00	
General.....	103 93	1,398 95	1,502 88	
	269 52	1,966 46		2,235 98
<i>British Columbia—</i>				
Anderson.....	1,992 53	77 77	2,070 30	
Babine.....	1,941 18	652 14	2,593 32	
Cowichan.....	2,086 01	37 48	2,123 49	
Cultus.....	5,469 77	2,289 76	7,759 53	
Kennedy.....	2,085 17	262 35	2,347 52	
Lakelse.....	2,158 11	382 04	2,540 15	
Lardeau.....	100 00	107 76	207 76	
Lloyds Creek.....	2,205 90	1,009 42	3,215 32	
Nelson.....	3,352 76	928 17	4,280 93	
Pemberton.....	3,304 88	66 08	3,370 96	
Penask.....	1,331 39	691 47	2,022 86	
Pitt.....	988 34	60 13	1,048 47	
Rivers Inlet.....	2,540 62	176 80	2,717 42	
Summerland.....	499 40	489 42	988 82	
Supervisors, Engineers and staff.....	8,056 68	71 61	8,128 29	
General Account.....		294 46	294 46	
General Account (Beaver Lake).....	681 84	277 90	959 74	
General Account (Canim Lake Investigation).....		109 14	109 14	
General Account (Cranbrook).....		1,600 72	1,600 72	
General Account (Fish Lake).....	284 61	166 53	451 14	
General Account (Gerrard).....	39 50		39 50	
General Account (Woods Lake and Otter Creek traps).....	110 80	131 45	242 25	
General Account (Murtle Lake).....	1,064 23	303 20	1,367 43	
	40,293 72	10,185 80		50,479 52
Total fish culture.....				214,528 63

DEPARTMENT OF FISHERIES

SUMMARY

	Personal Services	Other Outlay	Total by Hatcheries	Total by Provinces
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Nova Scotia.....	45,203 35	44,931 62	90,134 97	
Prince Edward Island.....	4,550 35	2,191 71	6,742 06	
New Brunswick.....	29,725 48	28,681 73	58,407 21	
Supervisors, Engineers and Staff (East).....	5,232 00	1,296 89	6,528 89	
General, East.....	269 52	1,966 46	2,235 98	
British Columbia.....	40,293 72	10,185 80	50,479 52	
	125,274 42	89,254 21	.....	214,528 63

CONSERVATION AND DEVELOPMENT OF DEEP SEA FISHERIES
EXPENDITURES 1936-37

Aids in expanding demands for fish.....	4,547 42
Educational work.....	13,397 14
Bait collection, Canso, N.S.....	931 50
Grants to exhibitions, N.S.....	1,800 00
Exhibitions.....	48 72
Bait freezer, Petit de Grat, N.S. }	
Bait freezer, Georgetown, P.E.I. }	4,157 31
Bait freezer, General	
Destruction of sea lions, B.C.....	273 73
Transhipment of fur seal skins, B.C.....	2,010 75
Fisheries Intelligence Service.....	3,293 80
Advertising.....	1,646 00
Grants to Lobster Fisheries Carnival—Pictou, N.S.....	500 00
Grants to United Maritime Fishermen.....	3,000 00
Aid to fishing fleet—Canso Petit de Grat (Arleux).....	7,000 00
General account.....	5,424 06
	<u>\$ 48,030 43</u>

BIOLOGICAL BOARD OF CANADA EXPENDITURE 1936-37

<i>St. Andrews Biological Station</i>	\$ 39,083 42	
Atlantic salmon investigation.....	317 79	
Cod and haddock investigation.....	2,547 28	
Cultural investigation.....	1,149 83	
General lakes survey.....	426 95	
Lobster investigation.....	957 01	
Oyster investigation.....	804 19	
Scallop investigation.....	484 34	
	<u>\$ 45,770 81</u>	
<i>Nanaimo Biological Station</i>	40,349 29	
Chemical investigation.....	1,286 45	
Miscellaneous Investigation.....	455 39	
Pacific Salmon Investigation.....	2,165 59	
Pacific Trout Investigation.....	508 10	
Pilchard and Herring Investigation.....	2,128 24	
Pink and Chum Investigation.....	2,415 76	
Shellfish Investigation.....	1,069 03	
	<u>50,377 85</u>	
<i>Gaspé Experimental Station</i>	9,438 44	
<i>Halifax Experimental Station</i>	37,393 92	
Investigations.....	1,793 75	39,187 67
	<u>32,212 43</u>	
<i>Prince Rupert Experimental Station</i>	961 62	33,174 05
Investigations.....		
General Account.....		20,032 28
Total Expenditure Biological Board.....	<u>\$ 197,981 10</u>	

APPENDIX No. 8

Following is a statement of the various kinds of licences issued by the Supervisors in their respective districts, during the 1936-37 season.

MAGDALEN ISLANDS, QUEBEC—ACTING SUPERVISOR J. J. LARABEE

Kind of Licences	Number of Licences Issued
Lobster fishing licences.....	984
Certificates of identification.....	Nil
Licences to can lobsters.....	15
Certificates under section 53—3	
Herring seine licences.....	18
Herring trap-net licences.....	27 (6 cod trap-nets)
Smelt gill-net licences.....	62
Smelt bag-net licences.....	1
	<hr/> 1,107

PRINCE EDWARD ISLAND—ACTING SUPERVISOR J. J. LARABEE

Lobster fishing licences.....	2,698 (1 cancelled)
Certificates of identification—52	
Licences to can lobsters.....	85 (1 cancelled)
Oysters fishery licences.....	256
Quahaug fishery licences.....	65
Certificates under section 53—2	
Lobster pound licences.....	Nil
Trap-net fishing licences.....	3
Salmon trap-net or pound-net licences.....	2
Set salmon gill-net licences.....	8
Gaspereau gill-net permits.....	Nil
Scallop fishery licences.....	1
Smelt gill-net licences.....	147
Smelt bag-net licences.....	202
Leases of oyster privileges—170 (2 cancelled)	
	<hr/> 3,467 (2 cancelled)

NOVA SCOTIA—DISTRICT No. 1—SUPERVISOR A. G. McLEOD

Lobster fishing licences.....	3,185
Certificates of identification—27 (1 cancelled)	
Licences to can lobsters.....	29
Oyster fishery licences.....	220
Certificates under section 53—64	
Trap-net fishing licences.....	30
Salmon trap-net, pound-net or weir licences.....	239
Special angling permits.....	188 (2 cancelled)
Set salmon gill-net licences.....	63
Gaspereau fishing licences.....	Nil
Scallop fishery licences.....	Nil
Smelt bag-net licences.....	46 (14 box-nets)
Smelt gill-net licences.....	141
	<hr/> 4,141 (2 cancelled)

NOVA SCOTIA—DISTRICT No. 2—SUPERVISOR E. D. FRASER

Lobster fishing licences.....	4,698
Certificates of identification—201 (1 cancelled)	
Licences to can lobsters.....	47
Oyster fishery licences.....	178
Quahaug fishery licences.....	49
Shad gill-net or drift-net licences.....	82
Certificates under section 53—84	
Lobster pound licences.....	6
Seine licences.....	104
Licences to a captain of a Canadian fishing vessel (using an otter or other trawl).....	3

NOVA SCOTIA—DISTRICT No. 2—SUPERVISOR E. D. FRASER—*Concluded*

Kind of Licences	Number of Licences Issued
Herring weir licences.....	17
Trap-net fishing licences.....	95
Salmon drift-net licences.....	65
Salmon trap-net, pound-net or weir licences.....	200
Special angling permits.....	177 (1 cancelled and 10 comp.)
Set salmon gill-net licences.....	367
Permits to catch smelts by use of dip-nets.....	239
Scallop fishery licences.....	2
Smelt gill-net licences.....	216
Smelt bag-net licences.....	165
Lobster pound certificates—250	
Interim Receipts—7	
	6,710 (1 cancelled and 10 comp.)

NOVA SCOTIA—DISTRICT No. 3—SUPERVISOR H. H. MARSHALL

Lobster fishing licences.....	3,226 (2 cancelled)
Certificates of identification—45	
Shad gill-net or drift-net licences.....	1
Certificates under section 53—133	
Lobster pound licences.....	10
Herring weir licences.....	41
Trap-net fishing licences.....	168
Salmon drift-net licences.....	3
Salmon trap-net, pound-net or weir licences.....	30
Salmon net permits (Medway river).....	23
Special Angling permits.....	650 (1 cancelled and 1 des.)
Set salmon gill-net licences.....	474 (1 cancelled)
Scallop fishery licences.....	145
Smelt bag-net licences.....	18
Smelt gill-net licences.....	50
Lobster pound certificates—534 (2 cancelled 2 torn out of books)	
	4,839 (4 cancelled and 1 des.)

NEW BRUNSWICK—DISTRICT No. 1—SUPERVISOR J. F. CALDER

Lobster fishing licences.....	494
Certificates of identification—22	
Shad gill-net or drift-net licences.....	40
Certificates under section 53—3	
Lobster pound licences.....	4
Herring weir licences.....	562
Clam permits.....	153
Salmon gill-net or drift-net licences.....	114
Herring seine licences.....	Nil
Scallop fishery licences.....	36
Smelt gill-net licences.....	Nil
Smelt bag-net or box-net licences.....	Nil
Lobster pound certificates—862	
Lease of Dark Harbour fishing privileges—1	
Lease of Beals Eddy Pond fishery—1	
	1,403

NEW BRUNSWICK—DISTRICT No. 2—SUPERVISOR A. L. BARRY

Lobster fishing licences.....	3,274 (5 cancelled and 18 free)
Certificates of identification—311 (1 cancelled)	
Licences to can lobsters.....	84 (3 cancelled)
Oysters fishery licences.....	827 (1 free)
Quahaug fishery licences.....	134
Shad gill-net or drift-net licences.....	Nil
Certificates under section 53—286	
Lobster pound licences.....	2
Herring weir licences.....	Nil
Gaspereau pound-net or trap-net licences.....	101
Salmon gill-net or drift-net licences.....	192
Salmon trap-net, pound-net or weir licences.....	385
Special angling permits (black salmon).....	21

NEW BRUNSWICK—DISTRICT No. 2—SUPERVISOR A. L. BARRY—*Concluded*

Kind of Licences	Number of Licences Issued
Tomcod trap-net licences.....	3
Scallop fishery licences.....	1
Bass fishery licences.....	Nil
Smelt gill-net licences.....	329
Smelt bag-net or box-net licences.....	6,031 (52 free)
Lobster pound certificates—256	
	<hr/> 11,384 (8 cancelled 71 free)

NEW BRUNSWICK—DISTRICT No. 3—SUPERVISOR L. H. PARKS

Shad gill-net or drift-net licences.....	192
Sturgeon fishery licences.....	3
Salmon net permits (St. John river).....	96
Gaspereau pound-net or trap-net licences.....	1
Salmon gill-net or drift-net licences.....	158
Salmon trap-net, pound-net or weir licences.....	98
Special angling permits (black salmon).....	698
Gaspereau gill-net licences.....	175
Shad dip-net fishing permits.....	90
Pickereel permits (net fishing).....	5
Pickereel permits (hook and line).....	100
Whitefish gill-net permits (Grand Lake—Chiputneticook System) . .	64
Bass fishery licences.....	33
Smelt bag-net or box-net licences.....	1
Interim Receipts—301 (3 cancelled)	
	<hr/> 1,714

PROVINCE OF BRITISH COLUMBIA—CHIEF SUPERVISOR J. A. MOTHERWELL

Abalone fishery licences.....	1
Special angling permits (seasonal).....	786 (3 cancelled)
Anglers day permits for non-residents.....	405 (4 cancelled)
Indian permits.....	2,058 (16 can.)
Crab fishery licences.....	129
Smelt or sardine fishery licences.....	40 (1 cancelled)
Miscellaneous licences.....	111 (2 cancelled)
Salmon fishery licences for gill-nets or drift-nets.....	5,195 (70 cancelled)
Salmon trolling licences.....	3,425 (13 cancelled)
Salmon trap-net licences.....	7
Licences to a captain of a salmon purse-seine boat.....	181 (1 cancelled)
Salmon purse-seine licences.....	288 (2 cancelled)
Salmon drag-seine licences.....	9
Grayfish fishery licences.....	124
Licences to assistant operators of salmon (purse or drag) seines.....	1,673
Licences to assistants in a boat used in operating a salmon gill-net or drift-net.	999 (1 cancelled)
Cod fishery licences.....	455 (11 cancelled)
Whaling licences.....	6
Licences to a captain of a Canadian halibut fishing boat, etc.....	11
Small dragger licences.....	31
Herring gill-net or drift-net licences.....	18
Herring purse-seine licences.....	40 (2 cancelled)
Pilchard purse-seine licences.....	30
Licences to a captain of a herring purse-seine boat.....	27
Licences to a captain of a pilchard purse-seine boat.....	26
Licences to assistant operators of herring purse-seines.	381
Licences to assistant operators of pilchard purse-seines.....	176
Herring pound permits.....	7
Pelagic sealing certificates—13	
	<hr/> 16,639 (126 cancelled)

YUKON TERRITORY

Special fishery licences.....	22
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PACIFIC COAST

Licences to United States halibut fishing vessels.....	176
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ATLANTIC COAST

Licences to United States fishing vessels.....	95 (1 cancelled)
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NORTHWEST TERRITORIES

Reduction works licences.....	Nil
Walrus licences.....	29 (incomplete)
Special angling permits (Hudson and James Bay).....	2
	<hr/> 31

Grand Total..... 51,728 (144 cancelled
10 complimentary
71 free 1 destroyed)

APPENDIX No. 9

COMPARATIVE STATEMENT OF LOBSTER FISHING LICENCES
FROM 1928

PRINCE EDWARD ISLAND AND MAGDALEN ISLANDS

Year	Magdalen Islands	Prince County	Kings County	Queens County	Kings and Queens (Southern portion)	Totals
1928.....	682	925	616	337	.....	2,560
1929.....	659	857	509	271	.....	2,296
1930.....	644	922	573	285	.....	2,424
1931.....	526	894	521	283	.....	2,224
1932.....	526	1,409	308	402	398	3,043
1933.....	599	1,359	324	438	485	2,606
1934.....	825	1,190	483	459	542	3,499
1935.....	931	1,110	538	487	591	3,657
1936.....	984	972	580	536	609	3,681

NOVA SCOTIA—DISTRICT No. 1

Year	Inverness County	Richmond County	Cape Breton County	Victoria County	Totals
1928.....	537	648	462	376	2,023
1929.....	501	636	435	329	1,901
1930.....	496	682	442	343	1,963
1931.....	473	745	458	367	2,043
1932.....	542	897	578	426	2,443
1933.....	656	1,092	773	534	3,055
1934.....	701	1,060	790	561	3,112
1935.....	738	1,026	691	503	2,958
1936.....	845	948	886	506	3,185

NOVA SCOTIA—DISTRICT No. 2

Year	Halifax Office	Halifax County	Patrol Boat	Guys- boro County	Antig- onish County	aPictou and Col- chester	aCum- berland County	bHants, Col- chester and Cum- berland County	Totals
1928....	183	976	41	1,021	334	521	171	17	3,264
1929....	153	767	435	1,047	283	358	221	7	3,271
1930....	131	1,135	204	1,087	308	349	255	9	3,478
1931....	142	1,200	170	1,139	273	352	299	15	3,590
1932....	105	1,364	14	1,330	339	462	399	14	*4,029
1933....	68	1,453	59	1,439	350	526	374	18	4,287
1934....	20	1,342	24	1,489	425	589	431	22	4,342
1935....	5	1,435	24	1,473	494	685	426	7	4,549
1936....	1	1,466	.....	1,563	506	732	420	10	4,698

a Northumberland Straits side.

b Bay of Fundy side.

* The 1932 total includes two licences issued by the District Supervisor.

DEPARTMENT OF FISHERIES

NOVA SCOTIA—DISTRICT No. 3

Year	Lunen- burg	Queens	Shel- burne	Yar- mouth	Digby	Kings	Anna- polis	Totals
1928.....	563	329	966	827	470	25	119	3,299
1929.....	472	217	850	792	463	27	120	2,941
1930.....	504	250	854	768	483	28	135	3,022
1931.....	590	296	1,016	770	430	.....	128	3,230
1932.....	491	290	965	673	312	.....	148	2,879
1933.....	525	262	1,112	720	415	21	141	3,196
1934.....	481	287	1,014	705	354	24	114	2,979
1935.....	562	307	1,100	758	370	21	85	3,203
1936.....	550	304	1,058	831	368	23	90	3,224

NEW BRUNSWICK—DISTRICT No. 1

Year	Charlotte	Saint John	Albert and West- morland	Totals
1928.....	433	86	1	520
1929.....	360	53	1	414
1930.....	288	57	2	347
1931.....	281	45	4	330
1932.....	380	101	2	483
1933.....	271	99	1	371
1934.....	*299	94	1	394
1935.....	a362	87	1	450
1936.....	408	85	1	494

NEW BRUNSWICK—DISTRICT No. 2

Year	Northum- berland County	Resti- gouche County	Gloucester County	Kent County	West morland County	Totals
1928.....	297	50	517	501	249	*1,981
1929.....	289	43	406	583	188	*1,834
1930.....	319	46	794	638	327	2,124
1931.....	300	54	647	765	326	2,192
1932.....	394	67	933	997	435	2,826
1933.....	407	77	1,041	989	720	3,234
1934.....	512	74	1,064	1,087	905	3,642
1935.....	509	80	986	1,035	719	3,329
1936.....	503	73	1,091	1,033	619	3,269

* The 1928 total includes 367 licences issued by the District Supervisor, the 1929 total 325 licences, the 1934, 3 licences, and 1935 one licence, so issued.

NOTE.—Cancelled licences are not included in the figures in this appendix.

APPENDIX No. 10

FISH CULTURE

ANNUAL REPORT BY J. A. RODD, DIRECTOR

Fish cultural operations of the Department of Fisheries are confined to those provinces in which it administers the fisheries in whole or in part, that is, Nova Scotia, New Brunswick, Prince Edward Island and British Columbia. The hatcheries located in the National Parks, Alberta, were in 1936 also directed by the Department of Fisheries but at the expense of the National Parks bureau; Lands, Parks and Forests branch Department of Mines and Resources.

The total distribution from the hatcheries operated by this department in 1936 was 111,672,400. The numbers of each species distributed were:—

STATEMENT BY SPECIES OF THE FISH AND FISH EGGS DISTRIBUTED FROM THE HATCHERIES DURING THE YEAR ENDED DECEMBER 31, 1936

Species	Green eggs	Eyed eggs	Fry	Advanced fry	Fingerlings	Yearlings and Older	Total distribution
<i>Salmo salar</i> —Atlantic salmon	6,000	9,000	1,298,453	5,432,500	19,280,643	823	26,027,419
<i>Salmo salar sebago</i> —Landlocked salmon						22,119	22,119
<i>Salmo irideus</i> —Rainbow trout				1,192,353	720,660	10,725	1,923,738
<i>Salmo clarkii</i> —Cutthroat trout		171,800		410,343	1,088,303	35	1,670,481
<i>Salmo rivularis</i> —Steelhead salmon		25,000			370,739	23,042	418,781
<i>Salmo rivularis</i> Kamloops—Kamloops trout		4,505,651	3,592,475		6,500		8,104,626
<i>Salmo levenensis</i> —Loch Leven trout					158	719	877
<i>Salmo fario</i> —Brown trout				140,000	316,510		456,510
<i>Salmo fario</i> —Hybrid brown trout (Brown trout—Atlantic salmon)					1,021	7,025	8,046
<i>Oncorhynchus nerka</i> —Sockeye salmon		8,913,255	48,116,430	4,951,525	2,408,669		64,389,879
<i>Oncorhynchus kennerlyi</i> —Kennerly's salmon		425,000	561,501				986,501
<i>Oncorhynchus kisutch</i> —Coho salmon			393,600				393,600
<i>Salvelinus fontinalis</i> —Speckled trout		60,500	184,876	774,630	6,063,924	17,879	7,101,809
<i>Cristivomer namaycush</i> —Salmon trout				96,180	71,834		168,014
	6,000	14,110,206	54,147,335	12,997,531	20,328,961	82,367	111,672,400

In addition to the above 553,070 cutthroat trout eyed eggs and fry were purchased from the Cranbrook Rod and Gun Club and planted direct as follows:—

Arrow lake	69,350	eyed eggs
Dunbar, Twin, (Fish lakes)	50,000	" "
Elk river	210,920	" "
Goat river	137,800	" "
Paddy Ryan lakes	35,000	" "
Summit lake	50,000	fry

553,070

The following classification of green eggs, eyed eggs, fry, advanced fry, No. 1 fingerlings, etc., applies to all statements and references in this report:—

Green eggs; eggs until they are "eyed."

Eyed eggs; eggs showing the eyes of the developing fish.

Fry; fish from date of hatch until free-swimming with the food sac fully absorbed. (No fry are distributed until the food sac is fully absorbed.)

Advanced fry; fry that are feeding systematically.

No. 1 fingerlings; fish that are feeding from two to eight weeks.

No. 2 fingerlings; fish that are feeding from eight to fourteen weeks.

No. 3 fingerlings; fish that are feeding from fourteen to twenty weeks.

No. 4 fingerlings; fish that are feeding from twenty to twenty-six weeks.

No. 5 fingerlings; fish that are feeding from twenty-six weeks to one year from date of hatch.

Inspections were continued with a view to locating waters where fish eggs might be obtained in sufficient quantities to warrant the establishing of collecting camps and also with a view to locating sites where the Fish Cultural Service might be extended advantageously to districts that are not readily accessible from existing hatcheries.

Experiments with equipment, methods and foods of various kinds were continued at several hatcheries. The experiments and the investigations in relation to fish cultural problems that were made by the Biological Board of Canada are referred to in Appendix No. 4 of the Report of the Department of Fisheries for 1936-37.

In the Okanagan district, British Columbia, a total of some 4,766 carp, squawfish and suckers were destroyed in four traps operated for the purpose at the outlet of Duck lake, in the connecting stream between Woods and Long lakes, at the outlet of Long lake, and in Otter creek. These traps were attended to by the Kelowna Rod and Gun Club, and the Vernon and District Fish and Game Protective Associations. Some 4,451 suckers were also destroyed in a trap in Sweltzer creek, British Columbia.

Twenty-three main hatcheries, eight subsidiary hatcheries, two rearing stations, eight salmon-retaining ponds and several egg-collecting stations were operated in 1936. The output from these establishments was as follows:—

THE FOLLOWING TABLE SHOWS THE HATCHERIES OPERATED, THEIR LOCATION, DATE OF ESTABLISHMENT, THE SPECIES AND THE NUMBER OF EACH SPECIES DISTRIBUTED FROM EACH HATCHERY DURING 1936

Estab- lished	Hatchery	Location	Species	Green eggs	Eyed eggs	Fry	Advanced fry	Fingerlings					Year- lings and older	Total distrib- ution by species	Total distrib- ution by hatcheries
								No. 1	No. 2	No. 3	No. 4	No. 5			
1929	Antigonish.....	St. Andrews, N.S.	Atlantic salmon.	.....	.....	.....	165,000	1,930,000	195,000	455	.....	.....	.....	2,290,000	.....
			Rainbow trout	.....	.....	.....	.....	870,341	85,000	30,035	68,400	.....	5,225	1,059,001	3,349,456
1876	Bedford.....	Bedford, N.S.	Speckled trout	.....	8,000	.....	275,000	1,406,860	108,185	.....	.....	.....	.....	1,798,045	.....
			Atlantic salmon	.....	.....	.....	.....	780,900	9,665	.....	.....	.....	.....	790,565	2,588,610
1936	Grand lake (I)....	Wellington Station N.S.	Speckled trout	.....	.....	.....	.....	.....	285,000	20,000	.....	33,200	.....	338,200	.....
			Landlocked sal- mon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1912	Lindloff (a).....	St. Peters, N.S.	Atlantic salmon	.....	.....	.....	.....	250,000	160,000	233,000	.....	.....	19,335	643,000	357,535
			Speckled trout	.....	.....	.....	.....	.....	.....	27,625	355,960	.....	.....	27,625	670,628
1902	Margaree.....	N. E. Margaree, N.S.	Atlantic salmon	.....	.....	475,000	1,600,000	1,110,000	220,000	160,000	.....	.....	.....	3,920,960	.....
			Speckled trout	.....	.....	.....	.....	155,000	125,000	20,000	230,000	91,017	2,872	623,889	4,544,849
1913	Middleton.....	Middleton, Ama- polis Co., N.S.	Atlantic salmon	.....	.....	.....	.....	625,000	440,000	364,144	.....	.....	.....	1,429,144	.....
			Salmon trout	.....	.....	.....	.....	68,725	.....	2,747	.....	.....	.....	71,472	.....
			Speckled trout	.....	.....	.....	.....	103,000	57,000	133,200	5,900	.....	12	299,112	1,799,728
1933	Nictaux Falls (d) ..	Nictaux Falls N.S.	Atlantic salmon	.....	.....	.....	.....	30,000	15,000	14,390	.....	.....	.....	59,390	.....
1929	Yarmouth.....	South Ohio, N.S.	Atlantic salmon	.....	.....	100,000	375,000	350,000	325,000	240,000	9,600	.....	.....	1,434,600	.....
			Kamloops trout	.....	.....	.....	.....	.....	.....	.....	.....	6,500	.....	6,500	.....
			Rainbow trout	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
			Speckled trout	.....	.....	.....	340,000	168,000	.....	.....	.....	.....	.....	25,705	.....
1928	Florenceville.....	Florenceville, N.B.	Atlantic salmon	.....	.....	.....	555,000	1,395,000	200,000	219,496	2,000	.....	.....	526,024	1,992,829
			Speckled trout	.....	.....	.....	.....	889,006	.....	.....	.....	.....	62	2,369,496	.....
1880	Grand Falls.....	Grand Falls, N.B.	Atlantic salmon	.....	.....	.....	.....	1,405,000	650,000	419,000	.....	.....	.....	859,062	3,255,558
			Speckled trout	.....	.....	.....	10,000	445,000	125,000	688,616	.....	.....	.....	2,474,000	.....
1874	Miramichi.....	South Esk, N.B.	Atlantic salmon	.....	1,000	.....	1,067,500	2,003,200	751,570	.....	.....	.....	.....	1,268,616	3,742,616
			Speckled trout	.....	.....	.....	.....	.....	.....	1,745	.....	.....	.....	3,623,270	.....
1874	Restigouche.....	Flatlands, N.B.	Atlantic salmon	.....	.....	443,453	.....	1,975,706	213,673	.....	.....	.....	98	1,843	3,825,113
			Speckled trout	.....	.....	.....	5,000	99,063	.....	.....	.....	.....	.....	2,632,832	.....
1914	Saint John.....	Saint John, N.B.	Atlantic salmon	(e) 6,000	.....	100,000	975,000	502,574	.....	.....	.....	.....	.....	104,063	2,736,895
			Brown trout, hy- brids	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,584,397	.....
			Landlocked sal- mon	.....	.....	.....	.....	.....	.....	.....	1,021	.....	7,025	8,046	.....
			Loch Leven trout	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,784	2,784	.....
1906	Kelly's Pond.....	Southport, P.E.I.	Speckled trout	.....	.....	.....	163,500	569,200	70,000	1,256	158	.....	.....	808,092	2,404,196
			Atlantic salmon	.....	.....	180,000	420,000	630,085	.....	.....	.....	.....	.....	1,230,085	.....
1914	Banff.....	Banff, Alberta.	Speckled trout	.....	.....	.....	.....	129,400	73,008	.....	.....	.....	.....	202,408	1,432,493
			Brown trout	.....	.....	.....	140,000	316,510	.....	.....	.....	.....	.....	456,510	.....
			Cutthroat trout	.....	150,000	.....	.....	650,910	221,410	.....	.....	.....	.....	1,022,320	.....
			Kamloops trout	.....	95,590	.....	.....	.....	.....	.....	.....	.....	.....	95,590	.....
			Rainbow trout	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	650,730	.....
			Salmon trout	.....	.....	.....	20,000	471,405	159,325	.....	362	.....	.....	96,542	.....
			Speckled trout	.....	500	.....	96,180	.....	.....	.....	.....	.....	.....	256,630	2,578,322
1928	Jasper Park (a)...	Jasper, Alberta...	Rainbow trout	.....	.....	.....	603,703	.....	.....	.....	.....	.....	.....	603,703	603,703
1928	Waterton lakes...	Twin Butte, Alta.	Cutthroat trout	.....	21,800	.....	391,900	135,500	.....	.....	.....	.....	35	565,437	.....
			Rainbow trout	.....	.....	.....	598,650	74,425	.....	.....	16,202	.....	70	643,145	1,208,952

THE FOLLOWING TABLE SHOWS THE HATCHERIES OPERATED, THEIR LOCATION, DATE OF ESTABLISHMENT, THE SPECIES AND THE NUMBER OF EACH SPECIES DISTRIBUTED FROM EACH HATCHERY DURING 1936—*Continued*

Estab- lished	Hatchery	Location	Species	Green eggs	Eyed eggs	Fry	Advanced fry	Fingerlings				Year- lings and older	Total distrib- ution by species	Total distrib- ution by hatcheries
								No. 1	No. 2	No. 3	No. 4	No. 5		
1916	Cultus lake	Cultus lake, Ved- der Crossing, B.C.	Coho salmon... Cutthroat trout... Kamloops trout... Sockeye salmon... Steelhead salmon			393,600... 18,443							393,600... 18,443 69,460 42,435	
1927	Smiths Falls (a)	Cultus lake, Ved- der Crossing, B.C.	Steelhead trout... Cutthroat trout... Steelhead salmon	25,000				103,052				64,281	128,052... 64,281	651,990
1906	Pemberton	Owl creek, B.C.	Steelhead trout... Kamloops trout...					232,580				23,042	290,729	355,010
1917	Pitt lake	Pitt river, Alvin, B.C.	Kamloops trout... Sockeye salmon...			147,170... 23,493,960							344,670... 23,493,960	23,838,630
1908	Babine lake	Babine lake, via Topley, B.C.	Sockeye salmon... Sockeye salmon...			2,879,380							2,879,380	2,879,380
1906	Rivers Inlet	Rivers Inlet, B.C.	Sockeye salmon...			6,149,736							6,149,736	6,149,736
1911	Anderson lake	Anderson lake, Kildonan, Van- couver Island, B.C.	Sockeye salmon...			7,459,530							17,919,477... 5,090,972	17,919,477... 5,090,972
1911	Kennedy lake	Kennedy lake, Tofino, Vancou- ver Island, B.C.	Sockeye salmon...			1,453,725	4,951,525	2,408,669					8,813,919	8,813,919
1933	Beaver lake (a)	Beaver lake, B.C.	Kamloops trout...			443,438	477,320						920,758	920,758
1922	Lloyd's creek (a)	Kelowna, B.C.	Kamloops trout...			1,929,000	897,735						2,826,735	2,826,735
1936	Murtle lake (c)	Blue river, B.C.	Kamloops trout...			43,820							43,820	43,820
1934	Argentina (a)	Argentina, B.C.	Kamloops trout...			437,260							437,260	437,260
1923	Nelson	Nelson, B.C.	Kamloops trout... Kennerly's salmon... Speckled trout...			441,303... 425,000... 60,000	437,260... 561,501... 184,876						850,052... 986,501... 244,876	1,219,758
1928	Penask lake (a)	Penask lake, via Quilchena, B.C.	Kamloops trout...			630,000	589,738						1,219,758	1,219,758
1928	Summerland (a)	Summerland, B.C.	Kamloops trout...			725,000	565,023						1,290,023	1,290,023
				6,000	14,110,206	54,147,335	12,997,531	22,284,105	4,475,551	2,574,577	689,291	305,407	111,672,400	111,672,400

(a) Subsidiary hatchery.

(c) Eyeing station.

(d) Pond and rearing station combined.
(e) Autumn collection 1936.
(f) Rearing station.

The eggs, fry and fingerlings included in this distribution, with the exceptions indicated, were from collection in the autumn of 1935 and the spring of 1936. In addition to the above 553,070 Cutthroat trout eyed eggs and fry were planted direct in British Columbia waters as detailed in previous statement.

HATCHERY OUTPUT, BY PROVINCES, OF EGGS, FRY, FINGERLINGS, YEARLINGS AND OLDER FISH DURING 1936

—	Green eggs	Eyed eggs	Fry	Advanced fry	Fingerlings					Yearlings and older	Total distri- bution by species	Total distri- bution by province
					No. 1	No. 2	No. 3	No. 4	No. 5			
<i>None</i>												
<i>Scotia—</i>												
Atlantic salmon.....		8,000	575,000	2,415,000	5,701,860	1,733,185	1,032,144	379,950	68,200	11,913,339	6,500	
Kumloops trout.....									6,500	19,335		
Landlocked salmon.....										19,335		
Rainbow trout.....									15,050	10,655		
Salmon trout.....										26,160		
Speckled trout.....										71,472		
										3,326,219		
										15,083		
		8,000	575,000	2,755,000	7,847,826	2,009,850	1,246,209	686,250	189,817	45,073	15,363,025	15,363,025
<i>New Brunswick—</i>												
Atlantic salmon.....	6,000	1,000	543,453	2,597,500	7,251,480	1,815,243	638,496			823	12,883,995	
Brown trout hybrids (Brown trout—At- lantic salmon).....								1,021		7,025	8,046	
Landlocked salmon.....										2,784	2,784	
Loch Leven trout.....								158		779	877	
Speckled trout.....								1,500		2,796	3,071,676	
	6,000	1,000	543,453	2,776,000	9,283,743	2,011,988	1,328,368	2,679		14,147	15,967,378	15,967,378
<i>Prince Edward Island—</i>												
Atlantic salmon.....			180,000	420,000	630,085	73,008					1,220,085	
Speckled trout.....					129,400						202,408	
			180,000	420,000	759,485	73,008					1,432,493	1,432,493
<i>Alberta—</i>												
Brown trout.....				140,000	316,510						456,510	
Cutthroat trout.....		171,800		391,900	786,410	221,410			16,202	35	1,587,757	
Kumloops trout.....		95,590									95,590	
Rainbow trout.....				1,192,353	545,880	159,325				70	1,897,578	
Salmon trout.....				96,180							96,542	
Speckled trout.....		500		256,130							256,630	
		267,890		2,076,563	1,648,750	380,735			362	105	4,390,607	4,390,607
<i>British Columbia—</i>												
Colo salmon.....			393,600								393,600	
Cutthroat trout.....				18,443							82,724	
Kumloops trout.....		4,410,061	3,592,475						64,281		8,002,536	
Kennedy's salmon.....		425,000	561,501								986,501	
Sockeye salmon.....		8,913,255	48,116,430	4,951,555	2,408,669						64,389,879	
Speckled trout.....		60,000	184,876								244,876	
Steelhead salmon.....		25,000			335,632				35,107	23,042	418,781	
		13,833,316	52,848,882	4,969,968	2,744,301				99,388	23,042	74,518,897	74,518,897
											111,672,400	111,672,400

In addition to the above 553,070 cutthroat trout eyed eggs and fry were planted direct in British Columbia waters as detailed in a previous statement.

The Canadian National, The Canadian Pacific, the Esquimalt and Nanaimo and the Dominion Atlantic Railway Companies continued their generous assistance and co-operation by furnishing free transportation for shipments of game fish and game fish eggs with their attendants. The extent of this co-operation is indicated in the following summary:—

Railways	Total mileage on trip passes	Number of passages	Mileage baggage car permits			Number of cases or cans			Number of permits
			Full	Empty	Total	Full	Empty	Total	
C.N.R.....	11,792	29	6,386	5,517	11,903	143	118	261	52
C.P.R.....	10,167	58	11,609	6,273	17,882	299	277	576	98
E. & N.R.....	61	1	61	61	122	3	3	6	2
D.A.R.....	434	8	217	217	434	35	35	70	8
	22,454	96	18,273	12,068	30,341	480	433	913	160

NOTE:—Number of passages refers to transportation one way, a return trip counting as two passages. Number of permits refers to one way passage for cases or cans.

An increased interest is being shown in fish cultural operations and assistance was tendered by private individuals and local organizations such as the boards of trade and fish and game clubs, angling and protective associations, service clubs, etc.

Officials and employees of other dominion departments, provincial officials, officers and crews of fishery patrol and protection boats, and other branches of this department have cordially co-operated in all instances where they could be of assistance.

An exchange of Atlantic salmon for cutthroat trout eyed eggs was made with the United States Bureau of Fisheries, Kamloops trout for salmon trout eyed eggs with the Department of Game and Fisheries, Toronto, and speckled trout for ouananiche eyed eggs with the Department of Mines and Fisheries, Quebec, details of which are given in a subsequent statement.

As a further test of the influence of environment on Atlantic salmon some 507,800 fingerlings, the progeny of "early" fish taken at New Mills, Chaleur bay, and which contribute to the summer angling in the Restigouche river, were distributed in the Saint John river and its tributaries; 275,200 from the Grand Falls hatchery in 1935 and 232,600 from the Grand Falls and Florenceville hatcheries in 1936. A good portion of these fingerlings were marked and when they are due to return the catches of the Saint John harbour nets and up-river anglers will be closely observed with a view to ascertaining if these fish transplanted to a large river system retain the characteristics of their parents or assume the characteristics of the salmon native to the Saint John river in regard to the season of the year at which they enter fresh water from the sea and ascend to the angling pools. Similar transplantations that have been made by the department in smaller rivers have in no instance changed a "late" to an "early" salmon stream and indicate that the season of the year at which Atlantic salmon enter and ascend fresh water streams from the sea is governed by environmental conditions and not by heredity. The experiment made by the Biological Board with the fry of "early" Restigouche river salmon in Apple river, Colchester county, Nova Scotia, (Apple river is a small "late" salmon stream) confirms the department's experience in regard to environment versus heredity in the smaller rivers.

Selective breeding of speckled trout continues to give satisfactory results. One hundred speckled trout fingerlings at the Yarmouth hatchery, the progeny of parents produced by selective breeding, weighed 204 ounces on January 1, 1937,

while the same number of fingerlings from the general hatchery run weighed 92 ounces only. Both groups of fingerlings were retained under similar conditions, given the same food for the same length of time and treated in all respects in the same way. Yearlings from the selective breeding stock at this hatchery produced 903 eggs per fish in 1936 as compared with 623 in 1934, an improvement of nearly 45 per cent in productivity.

Increased production of speckled trout eggs in 1936 over 1935 per female stripped occurred at the following hatcheries: Antigonish in the two and three year stock; Margaree in the two year trout; Yarmouth in the yearlings, two and three year fish; Florenceville in the five year, and Saint John in the yearlings, two, three and five year trout.

Some 6,208 Atlantic parent salmon were obtained for fish cultural purposes and retained at the various ponds operated by this department in the maritime provinces. Of these 4,174 were purchased from commercial fishermen and 2,034 caught in departmental traps. The following is the average weight in pounds of the salmon secured from various sources; In Nova Scotia: Margaree harbour, Inverness county, 12; Nictaux river, Annapolis county, 5.4; River Philip, Cumberland county, 15; Sackville river, Halifax county, 6. In New Brunswick: Miramichi river, Northumberland county, 8.3; Benjamin river, Restigouche county, 5; New Mills, Restigouche county, 16; Saint John harbour, Saint John county, 16. And in Prince Edward Island, Morell river, Kings county, 9.

A co-operative arrangement has been made with the Lands, Parks and Forests branch, Department of Mines and Resources, having in view the development of stream improvement in Burpee brook in the Acadian Forest Experimental Station area—a Dominion Government forest reserve—near Fredericton, New Brunswick. Biological, engineering and fish cultural features have been investigated and arrangements made for the construction of a number of V-type dams. Before this takes place an assessment will be made of natural fish food and fish population at the points where the dams are to be constructed by members of the staff of the Atlantic Biological Station and similar assessments will be made in about a year's time to gauge the effect of this type of construction towards improving conditions for fish life. Similar dams were constructed in 1936 in Pass creek in the Waterton Lakes National Park.

In co-operation with other departments and agencies several undertakings were carried to a successful conclusion during the year. Two hundred and ninety-eight small-mouthed black bass from one to three pounds in weight were transferred from Spanish, North Channel Georgian bay, Ontario, to Waskesiu lake in the Prince Albert National Park, Saskatchewan, in June, 1936. The bass were made available by the Department of Game and Fisheries of Ontario and transportation for the fish and their attendants was provided by the Canadian National and Canadian Pacific railways. The shipment left Spanish on May 30 in thirty galvanized tanks in a Canadian National Express car. They were transported by truck seventy miles from Prince Albert to Waskesiu beach and thence by boat to the distributing grounds and to the enclosures which had been provided for a portion of the shipment. Transfer was completed on the afternoon of June 2 without the loss of a single fish. Two hundred and thirteen were released at selected points in the lake and eighty-five were placed in the spawning enclosures. Spawning took place from June 21 to 26. Sixty per cent of the bass held in enclosures spawned, giving an estimated hatch of 85,000 fry. Hatching began June 24. The growth of the fry retained in the enclosures was quite satisfactory, the average length of these fish at the end of August being from two to three inches. A biological survey of the lakes covering several seasons was made, prior to the introduction of the bass, by Doctor D. S. Rawson of the University of Saskatchewan and the experiment was followed by him until the bass fingerlings were released. All expenses were taken care of by the Lands, Parks and Forest branch, Department of Mines and Resources.

Although Atlantic salmon have on numerous occasions been distributed in lakes long distances from the sea, no prolonged experiment has been undertaken by the department with a view to ascertaining if this species, if prevented from going to sea, will reproduce in inland waters and in this respect change from a migratory to a non-migratory fish. Atlantic salmon that have been distributed by the department in inland waters have had in several instances a good growth and have provided some excellent angling, but none of these fish have reproduced and established themselves in such waters.

With a view to gaining definite information as to whether or not Atlantic salmon, if confined to an inland lake, will reproduce and become established therein, 2,600 such fingerlings were transferred in October, 1936, from the Yarmouth hatchery, Nova Scotia, to Indian lake in the Snake River district, Quebec, not far from Mattawa. Prior to this introduction, a biological survey was made of Indian lake and connected lakes and streams by Professor W. J. K. Harkness, Director of the Ontario Fisheries Research Laboratory, University of Toronto, who will follow the experiment to its conclusion. The transportation and all other expenses connected with the experiment were met by an outstanding sportsman and ardent conservationist in the person of Mr. Moffatt Dunlop of Toronto. A further distribution of Atlantic salmon in these waters has been arranged for 1937.

The following biological surveys were undertaken also on a co-operative basis, viz., a preliminary biological survey of the lakes and streams of the Waterton Lakes National Park, Alberta, a more intensive biological examination of the waters of the Banff National Park and a preliminary examination of Astotin lake in the Elk Island National Park. The biological work was in charge of Doctor D. S. Rawson of the University of Saskatchewan. The Canadian Pacific Railway provided transportation for the workers and their equipment. The superintendents of the respective parks furnished assistance, transportation, etc., within the parks and other expenses were taken care of by the National Parks Bureau, Department of Mines and Resources.

Recommendations were submitted as were warranted by the progress made and information obtained in the respective surveys.

Upper and Lower Kananaskis lakes were also surveyed with a view to ascertaining their possibilities and development as sources of supply, respectively, for rainbow and cutthroat trout eggs for fish cultural purposes. In this survey Doctor Rawson was accompanied by the Director of Fisheries for the Province of Alberta. Free transportation was furnished by the railways as it was in the case of the aforementioned surveys. The Calgary Power Company provided transportation from their plant at Seebe, as well as living accommodation and assistance during the examination. The Department of Lands and Mines for Alberta looked after other expenses.

Extending the collection of speckled trout in New Brunswick, the Department secured eggs of this species from Fraser's pond, Three Brooks, near Plaster Rock, N.B., first in 1933 and each year since there has been an increase in the number of eggs taken. In 1933, the collection was 393,316; 1934—872,600; 1935—1,006,910; 1936—1,720,052. The collections were made by or under the supervision of the superintendent of the Grand Falls hatchery and the eggs collected were laid down for incubation in the Grand Falls hatchery.

Dr. Smith of the Biological Board continued to follow conditions at Stevenson's pond near Saint John, New Brunswick, and Wittenburg pond in Colchester county, Nova Scotia. These ponds were created by flooding low or swampy land.

Dr. R. H. M'Gonigle of the Biological Board investigated high mortalities at several of the Maritime hatcheries and gave the following diagnoses:—

Hatchery	Investigation	Diagnosis	Host Species
Antigonish.....	First..... Second.....	Chilodoniasis..... Bacterial Fin and Gill Rot.....	S. Salar. S. Fontinalis
Bedford.....	First..... Second.....	..... Ichthyophthirius.....	S. fontinalis S. salar.
Florenceville.....	First..... Second.....	Gyrodactyliasis..... Bacterial Fin Rot..... Gill Disease.....	S. fontinalis. S. salar. S. fontinalis.
Kelly's Pond.....	First..... Second.....	Phosphate analyses..... Ditto and Gas-bubble disease.....	S. salar and S. fontinalis.
Middleton.....	First..... Second.....	Chilodoniasis..... Bacterial infection of a furunculosis type.....	S. fontinalis. C. namaycush.
Yarmouth.....	.....	.....	S. fontinalis.

In two cases no diagnosis was made viz. at Bedford and Yarmouth hatcheries. Arrangements have been made for an investigation of longer duration at Yarmouth next year. Dr. Leim also made one trip of investigation, involving three separate hatchery mortalities occurring simultaneously.

In all cases where possible control (remedial) and preventive measures were recommended.

As Atlantic salmon are prevented by hydro development from reaching the greater portion of the spawning beds in the Mersey river, Nova Scotia, three spawning beds were made as an experiment below No. 3 development in that river during the autumn of 1934. As these first beds were used by salmon that year fifteen additional beds were made during 1935 and were also used to a considerable extent that season. In 1936 each one of the artificial beds was used by salmon and there is every appearance that so far as the provision of spawning facilities are concerned the experiment has been a complete success.

In the Saint John river system the sport fishermen captured 755 salmon and 1,182 grilse or 67 more salmon and 380 more grilse than were taken by angling in 1935. On the Miramichi, the sportsmen declared angling conditions had not been so good for fifteen years, and in any event the season's rod and line catch showed very large increase. As a matter of fact, the catch of grilse, approximately 23,000 fish, was nearly five times as large as it had been in 1935 and an increase of more than 1,000 brought the number of salmon captured up to 4,758. A thirty-five pound "black salmon", reported to be the largest of this kind ever caught in the province, was landed in April on the Southwest Miramichi river. Fishermen claim that this catch is the biggest "black salmon" ever landed in New Brunswick waters. A twenty-two pound salmon measuring forty-three inches in length was landed at the mouth of Cain's river.

The salmon anglers' catch in the Saint Marys river, Guysboro county, Nova Scotia, has progressively increased since that river was regularly stocked from Antigonish hatchery. Some 64 salmon were reported caught in 1934, 241 in 1935 and 930 in 1936. Six salmon caught in Baddeck river in 1936 is the first on record as having been landed on hook and line in this river.

In 1933 Loch Leven trout fry were planted in Upper Guysboro river, Nova Scotia, where a dam cuts off sea trout migration. In 1936 over a dozen good conditioned trout from five to eleven inches long were caught by one angler.

McKears brook, Guysboro county, was stocked with brown trout in 1925. The trout have reproduced and now fish of all sizes are taken up to sixteen inches long.

Prince Edward Island experienced one of the best seasons for trout angling it has had for a number of years.

Following the closing of the sockeye hatcheries in British Columbia the district supervisor of Fish Culture in that province, Mr. C. W. Harrison, was superannuated as from February 23, 1937. It is with regret that his death, on March 8, has to be recorded. A native of England, Mr. Harrison had been resident in the Dominion for many years. He entered the federal fisheries service in August 1910, joining the staff of the department's British Columbia division. In 1921 he was appointed district supervisor of fish culture, or as the office was then known, district inspector of fish culture. He continued to hold this position until the latter part of 1936 when his retirement leave began. Mr. Harrison was a capable officer with a sound knowledge of fish cultural practice.

MARITIME PROVINCES EASTERN DIVISION

DISTRICT SUPERVISOR OF FISH CULTURE, JAMES CATT

Considerable progress in fish culture was made in 1936—largely along the lines of improving and adding to the existing plants and in the opening of the new Cobequid hatchery at Jackson, Cumberland county, Nova Scotia.

Further progress in hatchery operations was again made possible through the valuable co-operation of the officials of the administrative branch of the department, the directors and staffs of the Biological Board stations, the maritime provincial governments' officials, the fish and game protective associations, and the guides' associations.

At the annual meetings of the parent fish and game protective associations for Prince Edward Island and Nova Scotia motions expressing the sincere appreciation of fish cultural work was brought forward and carried unanimously.

There was a commendable increase in the number of speckled trout eggs taken at the Eastern hatcheries in 1936 amounting to 49·8 per cent over 1935—the total number taken in this division this year being 18,230,754 as against 12,163,522 last year. Hatcheries showing increased collections were: Antigonish 9,448,727—an increase of 67·3 per cent; Margaree 1,931,696—an increase of 121·1 per cent; Saint John 2,283,286—an increase of 48·0 per cent and Kelly's pond 550,800—an increase of 160·5 per cent. Some 98,900 of the eggs for Kelly's pond hatchery were taken in Fortune river and were of the sea-run variety. Initial collections were made by the superintendent of the Cobequid hatchery at Hart lake of 81,870 and at Poison lake of 8,200. The superintendent of Middleton hatchery collected at Sand lake 160,500.

Fishery supervisors and their staffs made preliminary selections of possible hatchery or rearing pond sites in Madawaska and Restigouche counties, New Brunswick, and in the three counties of Prince Edward Island, which proved of great assistance in expediting final selections from biological, engineering and fish cultural points of view. These investigations were carried out by Mr. H. A. Lynch, senior Assistant Engineer, Doctors M. W. Smith and R. H. M'Gonigle of the Saint Andrews Biological station and Mr. James Catt, District Supervisor of Fish Culture. In Prince Edward Island the president of the fish and game protective association at Charlottetown and members of the Summerside protective association rendered valuable assistance by accompanying the investigators and bringing to their notice possible hatchery and pond sites which otherwise might have been overlooked.

Natural food and water conditions had restored themselves to a sufficient extent in lake Jesse, Yarmouth county, Nova Scotia, which in 1934 was treated with copper sulphate to destroy competitor and enemy fish, to admit of the lake

being restocked in 1936. Consequently, 45,000 speckled trout fingerlings were distributed therein during the year.

As the treatment of this lake had given such satisfactory results, two additional lakes, namely, Tedford in Yarmouth county, and Boar's Back in Digby county, were similarly treated on August 3 and 5 respectively. The treatment was carried out by the staff of the Yarmouth hatchery in cooperation with Doctor M. W. Smith of the Atlantic Biological Station, local fishery officers, volunteers, and members of the Yarmouth Fish and Game Protective Association. Approximately 86,000 fish were killed in Tedford and 27,000 in Boar's Back lake. White perch were the dominant enemies of speckled trout in the former and yellow perch in the latter lake. In Tedford lake no trout whatever were found and in Boar's Back less than 100 trout amongst the fish that were killed. In a population of some 150,000 fish in the three lakes, well over one-half were potential enemies of speckled trout.

An experiment to determine how best to make use of over-stocked trout streams was made. A few such streams are to be found in the less accessible portions of Nova Scotia and New Brunswick. They usually have very efficient spawning grounds and an entire absence of enemy and predatory fishes. For the purpose of the experiment, 930 speckled trout were obtained from Rairdon brook, Kings county, New Brunswick, in October 1935 and transferred to Saint John hatchery. The aggregate weight of these fish was forty-five pounds and the average weight 0.8 ounces. They were retained at the Saint John hatchery where the condition of their habitat was improved by a greatly increased food supply. On May 22, 1936 they averaged 1.3 ounces, on August 26 three ounces, and on October 19 three decimal seven ounces. They had increased in length during the period of retention from 5 inches to $9\frac{1}{4}$ inches. The average yield of eggs per female of this group was small being 331 as compared with the hatchery pond stock, the yield from which per female was—one year olds 487, 2 year olds 754, 3 year olds, 1,378 and five year olds 2,092. This stock was marked by the removal of the right pectoral fin and distributed, 364 in Beaver lake and 300 in Ping Pong lake in the vicinity of Saint John, from which reports on recaptures will be made. Further investigations were carried out at Rairdon brook in the summer and fall. Many trout were examined; they varied from three and a half to seven inches in length, with an average of approximately five inches. Some of these specimens would have spawned in the fall.

Successful live fish exhibits were made during the year at the Apple Blossom Carnival, Kentville, at the Yarmouth County Exhibition held at Yarmouth and at the Municipality of Clare Exhibition at Little Brook, Nova Scotia, under the supervision of Mr. H. V. Gates, superintendent of the Yarmouth hatchery; at the Fredericton and Woodstock exhibitions under Mr. George Sutherland, superintendent of the Florenceville hatchery, and at the Saint John exhibition under the direction of Mr. J. D. Nichol, superintendent of the Saint John hatchery. Mr. Gates, loaned to the Provincial Government of Nova Scotia, accompanied an exhibit consisting of live rainbow and speckled trout of various ages to the Sportsmen's Shows at Boston, Hartford and New York, and Assistant Wm. T. Owens, loaned to the Provincial Government of New Brunswick, took charge of an exhibit including adult Atlantic salmon and speckled trout of various ages to the three above mentioned cities in the United States. This work was carried out most successfully. It was the first time that adult Atlantic salmon had been successfully included in these exhibits.

At the Margaree and Antigonish hatcheries preventative treatment to combat disease in salmon and trout through the use of constant flow siphons proved of value.

A new rearing station was completed on Mill brook, between Grafton lake and lake Kejimikujik, Nova Scotia, consisting of fifteen circular ponds, ice house and freezer.

A large number of both salmon and trout were again marked by the removal of one or more fins before distribution from hatcheries. Details are given in a subsequent statement.

ANTIGONISH HATCHERY

K. G. Skillington, Superintendent

The Antigonish hatchery carried its full capacity of Atlantic salmon and speckled trout and a small collection of rainbow trout eggs amounting to 8,985. Valuable assistance was rendered by the New Glasgow and Pictou Fish and Game Protective Associations in the distribution of some 250,000 speckled trout fingerlings in their districts. In addition to the above an exchange of twenty-seven thousand speckled trout eyed eggs for ouananiche eggs was made with the Department of Mines and Fisheries at Quebec, the eggs being laid down at their provincial hatchery at Gaspé. The ouananiche eggs were allotted to Saint John hatchery.

Three additional fifty-foot circular ponds were completed and put in operation during the year, and much improvement was made to hatchery equipment and grounds; including installation of a 32 volt electric light plant with 1,500 watt generator and 240 ampere hour batteries.

The total collection of speckled trout eggs made from brood stock developed at the hatchery showed a substantial increase to 9,448,727 as against 5,647,161 secured in the fall of 1935, and constituted a new speckled trout collection record for an individual Canadian hatchery.

In March, 2,750,000 Atlantic salmon eyed eggs were received from the Miramichi hatchery. Outgoing shipments of speckled trout eyed eggs to other hatcheries were: 1,000,000 to Bedford, 250,000 to Lindloff, 700,000 to Middleton, 900,000 to Yarmouth, 150,000 to Restigouche, 27,000 to Gaspé and 50,000 to Kelly's Pond. Distributions for the season were: Atlantic salmon 2,290,000, rainbow trout 455 and speckled trout 1,059,001 of which 7,900 were marked by the removal of the adipose and right pectoral fins; total 3,349,456.

BEDFORD HATCHERY AND SACKVILLE RIVER SALMON POND

George Heatley, Superintendent

A good distribution of Atlantic salmon and speckled trout in the advanced fry stage was made from the Bedford hatchery this year.

In March, 1,000,000 Atlantic salmon eyed eggs were shipped to the Yarmouth hatchery, and in the same month 21,000 landlocked salmon eyed eggs and in May, 400,000 Atlantic salmon fry and advanced fry were transferred to the Grand lake rearing ponds to be later distributed from that establishment.

In February, 1,000,000 speckled trout eyed eggs were received from the Antigonish hatchery. The following supplies of eggs were received in the fall of the year: 1,030,000 Atlantic salmon from the Sackville pond and 58,000 landlocked salmon from the Grand lake ponds and camp, in addition to 1,000,000 speckled trout eyed eggs purchased from the American Fish Culture Company, Carolina, Rhode Island. At the request of the Department of Highways, Nova Scotia, twelve parent salmon were transferred to and retained at the Bedford hatchery for future exhibition purposes. Distributions for the year were: Atlantic salmon 1,798,045, and speckled trout 790,565; total, 2,588,610.

At the Sackville river salmon pond this season a great many grilse were caught ranging from three and a half to four and a half pounds in weight after they had been stripped. Scales from these fish were sent Doctor A. G. Huntsman, Editor and Consulting Director of the Biological Board and he advised that he examined a number of these samples from 3½ to 4½ pound fish and found them to be invariably grilse with 2 years' growth as parr and 1+ years' growth

after becoming smolts. The eggs from these fish although somewhat smaller than those from the adult salmon were of good quality. The number of salmon impounded for fish cultural purposes was 329, taken from August 31 to October 29, during which period there was a loss of three. The total collection of eggs was 1,030,000, of which about one-third was taken from grilse and the remainder from adult salmon; all eggs were laid down in the Bedford hatchery.

COBEQUID HATCHERY AND RIVER PHILIP SALMON POND

J. W. Heatley, Superintendent

As was previously reported, the Cobequid hatchery buildings were completed in the autumn of 1935. During the season of 1936, 24 circular rearing ponds, each 25 feet in diameter and 2 feet deep in the centre were added to this establishment. The water supply and other conditions admit of a further addition of at least 24 ponds of the same dimensions. The main water supply pipe runs through the middle of the pond area with branch feed pipes to each pond. The main drainage flume is immediately under the supply pipe, running the full length of the system and connected with branch drains to each pond. Consideration was given to various methods of waterproofing the ponds, which are located in a somewhat gravelly and porous formation, and the following method was adopted:—

A concrete slab was built in the centre of each pond to support the overflow and screen arrangements. The balance of the pond bottom was first covered with two inches of sand. On this was placed a layer of "fibreen," a tough quality of building paper with fibres and asphalt between two cemented layers. Clay filling was then puddled four inches thick over the paper, sufficient sand being incorporated to form a binder. Approximately 770 feet of fourteen-inch diameter wood stave pipe was laid and 390 feet of flume ten inches deep and varying from thirty to thirty-six inches in width was built to provide drainage facilities. The grounds were graded and a protecting wall built along the river bank. A thirty-two volt electric light plant with a 1,500 watt generator and 240 ampere hour batteries was installed.

Wild speckled trout ova were collected at Hart and Poison lakes and the possibilities of an increased collection were investigated. A small collection of 81,870 eggs secured at Hart lake may be attributed to some extent to the proportion of only 160 females to 347 males taken from October 21 to November 8. On November 13 the camp was moved to Poison lake where 304 trout ranging from four to six inches in length were dipped from a pool near the outlet of the lake. The number of eggs collected at Poison lake was 8,200.

In November, 3,579,940 Atlantic salmon eggs were received from River Philip pond.

A large number of people visited the hatchery during the summer and are apparently taking a great interest. Fish, forest and game protective associations, rod and gun clubs, etc., have indicated that they will co-operate in every way to make fish culture in this district a success.

On September 15 repairs were commenced to the River Philip power dam and old fishway, which had been damaged by preceding spring freshets. There was apparently a very large run of Atlantic salmon in the river this season, and it was observed that it commenced considerably earlier than in previous years. The first fish were taken on September 25. By November 4, some 1,161 salmon were impounded, which was more than sufficient for the number of eggs required. The fence was then opened and the balance of the run allowed to ascend through the dam. The loss of fish during retention was 4. Of the fish impounded, only 621 were stripped, the remaining 536 being liberated above the dam. The collection was 3,579,940 salmon eggs, which were laid down in the Cobequid hatchery.

GRAND LAKE REARING PONDS

E. Barrett, Officer in Charge

The Grand Lake rearing ponds, which were operated by the Provincial Department of Lands and Forests since they were built in 1933, were deeded to the Department of Fisheries and operated by this department from October 1, 1936. These ponds in the first instance owe their existence to the efforts of Dr. A. C. Fales, Wolfville, Nova Scotia, and the officers and members of various fish and game protective associations. The site was purchased by these gentlemen in 1933 and deeded to the province of Nova Scotia. Eight ponds, each 100 feet long and 6 feet 7 inches wide, were built under the supervision of officers of the Department of Fisheries. They have since been operated by the province until transferred to this department. At the time of transfer there were some 69,700 Atlantic salmon fingerlings, 14,500 sebago salmon fingerlings, 800 ouananiche yearlings and 200 two-year-old sebago salmon in the ponds.

Some forty of the female pond-reared sebago salmon were stripped and produced 22,000 eggs. These fish were approximately fourteen inches in length and averaged about one pound in weight. A permanent fence and trap for sebago salmon was built in Rawdon river at Grand lake, principally for the purpose of determining the nature of the run of fish at this point and its possibilities for egg-collecting purposes. Only twenty-eight salmon were taken in the trap and these, with twenty-three from Fletcher's run, yielded 36,000 eggs. After they were stripped, thirty-five of these fish were placed in the Grand Lake rearing ponds and the remaining sixteen were marked by the removal of the adipose and right ventral fins and liberated in Grand lake.

Distributions for the season were: Atlantic salmon 338,200 and sebago salmon, 19,335; total, 357,535. With exception of plantings in Grand Lake, the distributions were carried out with the assistance of the Bedford hatchery staff. Of the above 135 sebago salmon two-year-olds were marked before being liberated by the removal of the adipose and right ventral fins.

MARGAREE AND LINDLOFF HATCHERIES

W. D. Turnbull, Superintendent

Satisfactory distributions of Atlantic salmon and speckled trout from the Margaree hatchery in 1936 were made, although the growth of the salmon fingerlings was not quite equal to that of 1935. All available ponds were loaded to capacity with fingerlings and speckled trout brood stock. Large numbers of salmon and trout fingerlings and yearlings were observed in nearly all streams previously stocked from this hatchery, and good results from earlier plantings were in evidence when distributions were made in the same areas later in the season.

Special work undertaken and completed during the year consisted of the change of the hatchery office into a feed-room with a concrete floor and a drain to the river and construction of a new foundation for the engine. Construction work was also commenced on five new circular ponds, which are expected to be completed early next season.

Although the number of speckled trout eggs collected from the brood stock developed at the Margaree hatchery was less than at either the Antigonish or Saint John hatcheries, the collection set a new record for this plant, showing a large increase over the previous years, namely, 1,931,696 eggs, as compared with 873,574 in 1935 and 186,371 in 1934.

In April 750,000 Atlantic salmon eyed eggs were transferred to the Lindloff hatchery for incubation.

In November and December 3,201,500 Atlantic salmon eggs were received from the Margaree salmon pond. Distributions for the season were: Atlantic salmon 3,920,960 and speckled trout 623,889; total, 4,544,849. Of the above 24,234 Atlantic salmon and 1,876 speckled trout were marked by the removal of the adipose and right pectoral fins.

Distributions from the Lindloff hatchery, which was in charge of Assistant F. F. Annis in 1936, were augmented by those from the Margaree hatchery, particularly in the Sydney area. To prevent the ascent of eels into the ponds a barrier was constructed in the hatchery brook during the year.

The following eyed eggs were received in April: 750,000 Atlantic salmon from the Margaree hatchery and 250,000 speckled trout from the Antigonish hatchery. Distributions were: Atlantic salmon 643,000, of which some 15,000 were marked by the removal of the adipose and left pectoral fins, and 27,628 speckled trout; total, 670,628.

MARGAREE SALMON POND

J. P. Chiasson, Superintendent

Some 402 parent Atlantic salmon were secured between September 17 and November 18. Only three were lost during the retention period which terminated when the last eggs were taken on December 9. A collection of 3,201,500 eggs of good quality was obtained and laid down in the Margaree hatchery.

MIDDLETON HATCHERY AND NICTAUX SALMON POND AND REARING STATION

F. M. Millett, Superintendent, J. W. Heatley and W. T. Owens, Officers in Charge

The output of Atlantic salmon, salmon and speckled trout fingerlings from the Middleton hatchery in 1936 was very satisfactory, and much favourable comment was received during the year on improved fishing in lakes stocked from this establishment especially those on the North Mountain. During August the hatchery pond was drained and 12 speckled trout yearlings taken and distributed in Lily lake, Annapolis county. The pond was again filled and restocked with some 500 speckled trout No. 4 fingerlings.

Sand lake, Annapolis county, was stocked from the Middleton hatchery in 1926 and 1929, and following these years was fished very intensely until there were hardly any more fish being caught and the lake appeared to be practically barren when it was again stocked in 1934. The speckled trout fingerlings planted that year made a remarkably rapid growth and in the fall of 1935 the superintendent of the Middleton hatchery made a small experimental collection at this point.

In 1936 a collection of wild speckled trout ova of good quality was made at this lake on the North Mountain. The lake has been closed to the angling public and posters to this effect prominently displayed. From November 3 to 8 inclusive 224 trout averaging one pound in weight were taken, from which 160,500 eggs were secured.

In addition to general improvements at the Middleton hatchery, extensive repairs were made at nearby Stevens ponds.

Atlantic salmon transferred to the Nictaux rearing station were: in May 200,000 advanced fry (156,600 of these were returned to Stevens ponds at the end of the same month as the Avon River Power Company had to repair their power dam; 30,000 were distributed), and in August 30,000 fingerlings.

Eyed eggs received during the year were: in February 100,000 salmon trout from the Provincial Department of Game and Fisheries, via Belleville hatchery, Ontario, in March 700,000 speckled trout from the Antigonish hatchery and in

December 1,545,000 speckled trout purchased from the American Fish Culture Company, Carolina, Rhode Island, U.S.A. In the autumn 514,700 Atlantic salmon eggs were received from the Nictaux salmon pond.

Distributions from Middleton hatchery were: Atlantic salmon 1,429,144, salmon trout 71,472 and speckled trout 299,112; total, 1,799,728. Of the above 2,747 salmon trout and 1,000 speckled trout were marked by the removal of the adipose and left ventral fins.

At the Nictaux pond owing to a break in the power dam of the Avon River Power Company, the salmon from the early run were lost. Although a number of the fish were stopped by a rack over the waste gate at upper dam and later captured and returned to the pond, a greater number of salmon under normal conditions would have been impounded this season if the break had not occurred. Out of the 162 salmon obtained from June 17 to October 18, there was a loss of 28 due mostly to extra handling and injuries. The total collection of 514,700 eggs was laid down in the Middleton hatchery.

Operations at the Nictaux rearing station were quite limited this year, as repairs were being made to the power dam during a greater part of the summer. In May 200,000 Atlantic salmon advanced fry were received from the Middleton hatchery; 30,000 of which were released in the Nictaux river and the balance, 156,600, returned to Stevens ponds, Middleton hatchery, at the end of that month. In August 30,000 Atlantic salmon fingerlings from the Middleton hatchery were placed in the station, resultant from which 29,390 were distributed. The total distribution for the season was 59,390 Atlantic salmon of which 13,000 were marked by the removal of the adipose and left ventral fins.

YARMOUTH HATCHERY

H. V. Gates, Superintendent

After the first weeks of June the result of rearing at the Yarmouth hatchery was better than usual. The stock was of excellent size and quality and permitted a large distribution of fall fingerlings, as well as the retention of an increased number for release as yearlings. The 1936 distribution consisted of fish of various stages and ages, exceeding the 1935 output by 463,525.

A collection of 336,000 speckled trout eggs which is somewhat smaller than that of the previous year was made from the brood stock developed at the hatchery. The hatchery ponds also produced 192,000 rainbow trout eggs of good quality, exceeding the collections of former years; they also yielded 11,000 Kamloops trout eggs.

Evidence of the importance of selective breeding is apparent at this hatchery as intimated on a previous page of this report.

Live rainbow and speckled trout of different ages were allotted the provincial Department of Highways, Nova Scotia, in connection with their exhibits at the Sportsmen's Shows at Boston, Hartford and New York. Superintendent H. V. Gates accompanied the shipment. Live fish exhibits of rainbow and speckled trout in various stages of development from fingerlings to adult fish were also shown at the Apple Blossom Carnival, Kentville, and at the Yarmouth County Exhibition, Yarmouth, where an additional attraction was adult Atlantic salmon which had been captured in the Tusket river. At the Municipality of Clare Exhibition, Little Brook, adult Atlantic salmon, rainbow and speckled trout were on exhibit.

On October 24 an experimental shipment of Atlantic salmon fingerlings was distributed in Indian lake and tributaries, Snake Creek district, Quebec, as reported in detail on a previous page.

The following eyed eggs were received during the season: in March 900,000 speckled trout from Antigonish hatchery and 1,000,000 Atlantic salmon from Bedford hatchery; and in the fall 1,644,500 speckled trout eggs purchased from

the American Fish Culture Company, Carolina, Rhode Island. In November 1,758,240 Atlantic salmon green eggs were received from the Saint John pond.

Lake Jesse, which was successfully treated with copper sulphate in 1934 for removal of enemy fish was stocked in June with some 45,000 speckled trout No. 1 fingerlings. The hatchery staff assisted in 1936 in treating with copper sulphate Boar's Back and Tedford lakes in order to eliminate the coarse fish therein.

Distributions for the season were: Atlantic salmon 1,434,600, Kamloops trout 6,500, rainbow trout 25,705, and speckled trout 526,024; total, 1,992,829. Of the above 44,000 Atlantic salmon fingerlings and 13,907 speckled trout fingerlings, yearlings and older fish were marked by the removal of adipose and right ventral fins.

Much valuable assistance was afforded by Supervisor H. H. Marshall, by fisheries inspectors, and by fish and game protective associations in distributing hatchery product.

FLORENCEVILLE HATCHERY

George Sutherland, Superintendent

This hatchery had a very satisfactory season and a good distribution of Atlantic salmon and speckled trout advanced fry and fingerlings was made. The collection of speckled trout ova from the hatchery ponds was 1,709,623, which is somewhat smaller than that of the previous year.

The location of the outside troughs was changed from the back of the hatchery to the hatchery dam, and a building 42 feet by 50 feet to enclose these troughs was completed with the exception of roofing. When this building is finished it will augment the hatchery capacity by sixteen troughs.

Two and four year old speckled trout from the hatchery ponds were allotted to the Bureau of Information and Tourist Travel for the Province of New Brunswick in connection with their exhibits at the Sportsmen's Shows at Boston, Hartford and New York, and Atlantic salmon fingerlings, speckled trout fingerlings and older fish were loaned to the New Brunswick Fish and Game Protective Association for their exhibits at the Fredericton and Woodstock Exhibitions, New Brunswick.

In March 597,126 speckled trout eyed eggs were transferred to the Grand Falls hatchery.

Atlantic salmon eyed eggs received from other hatcheries during the year were: in March 1,500,000 from Miramichi, and 30,000 from Restigouche the resultant fingerlings from which were distributed in the Nashwaak river in a continuation of the experiment of introducing progeny from early run salmon to this stream. In September 5,000 speckled trout fingerlings were received from Grand Falls hatchery: in the autumn 1,504,800 Atlantic salmon ova were received from the Saint John salmon pond. Distributions were: Atlantic salmon 2,369,496, of which 24,570 were marked by the removal of the adipose and left pectoral fins, and speckled trout 889,062; total 3,258,558.

GRAND FALLS HATCHERY

W. A. McCluskey, Superintendent

A slightly larger-than-usual distribution of advanced fry and fingerlings of Atlantic salmon and speckled trout was made from the Grand Falls hatchery this year. Much valuable assistance was afforded by the Grand Falls and Madawaska Fish and Game Clubs in the distributing of hatchery product.

Four circular ponds were completed during the year, which will be in operation the coming season. A 32 volt electric lighting plant with 1,500 watt generator and 240 ampere hour batteries was installed. A new verandah was built on the front of the dwelling and a window placed in south side of residence in upper story.

An excellent collection of 1,720,052 wild speckled trout ova, exceeding that of the 1935 collection by over 713,000 was made in the autumn at Fraser's pond, Three brooks. This is the largest collection yet made at that point. The eggs were laid down in the Grand Falls hatchery and 1,290,000 of them purchased from the owner of the pond, when they had reached the eyed stage.

In September 5,000 speckled trout fingerlings were transferred to the Florenceville hatchery.

The following eyed eggs were received from other hatcheries: in March 500,000 and 220,000 Atlantic salmon from Miramichi and Restigouche, respectively, and 597,126 speckled trout from Florenceville; in December 1,000,000 speckled trout purchased from the American Fish Culture Company, Carolina, Rhode Island. In the autumn 2,197,800 Atlantic salmon ova were received from the Saint John salmon pond. Distributions were: Atlantic salmon 2,474,000 and speckled trout 1,268,616; total 3,742,616. Of the above 44,000 Atlantic salmon were marked by the removal of the adipose and right pectoral fins.

MIRAMICHI HATCHERY AND MIRAMICHI SALMON RETAINING POND

Frank Burgess, Superintendent

The Miramichi hatchery in 1936, produced a good distribution of Atlantic salmon fry and fingerlings and in addition a small distribution of speckled trout from 12,000 trout fingerlings received from Restigouche hatchery in July. Some 98 trout yearlings which were retained in pond No. 1 from the fall of 1935 without a loss were also distributed.

In March the following shipments of Atlantic salmon eyed eggs were made: 1,000 to Doctor A. G. Huntsman, University of Toronto; 2,750,000 to Antigonish hatchery, 1,500,000 to Florenceville hatchery; 500,000 to Grand Falls hatchery, and through an exchange agreement with the United States Bureau of Fisheries, 1,500,000 to Craig Brook hatchery, Maine.

A 32 volt electric lighting plant with 1,500 watt generator and 240 ampere hour batteries was installed.

Distributions for the season were: 3,823,270 Atlantic salmon, and 1,843 speckled trout; total, 3,825,113. Of the above 9,900 salmon fingerlings, 700 trout fingerlings and 98 trout yearlings were marked by the removal of the adipose and right ventral fins.

A collection of 8,957,972 ova was made in the autumn from some 2,000 Atlantic brood salmon purchased and impounded at the Miramichi pond. All eggs were laid down in the Miramichi hatchery. The first fish was captured on September 7 and the last on October 14. Of the fish retained, there was a normal loss of 49 or 2.4 per cent.

NEW MILLS SALMON POND

Wm. White, Superintendent

Most of the Atlantic salmon for the New Mills pond were from the early spring run, and were purchased from the commercial fishermen of the district between May 26 and July 10. The patrol boat "Gilbert" did the towing of the salmon from the nets to the pond. The number of salmon obtained was 438, from which there was a small loss of 7 due to injuries received in the nets, and not detected when the fish were being placed in the pond. Due to a shortage of male salmon in the New Mills collection a further 39 fish were secured from Benjamin river between September 16 and 23, making a total of 470 salmon available for fish cultural purposes. The total collection of eggs was 2,351,820, which were laid down in the Restigouche hatchery.

A two and one-half pound female grilse was stripped at the New Mills pond this season. This fish was captured some two hundred yards from the mouth of the Benjamin river on September 22 and was heavily spotted. The presence of a female grilse so small and so heavily spotted is quite unusual in that region. An examination of the scales by Doctor A. G. Huntsman, Editor and Consulting Director of the Biological Board indicated that the salmon grew two years in the stream in the usual way and that the rapid growth that followed appeared to be all sea growth which was interrupted after a short time and then continued. It appears that the salmon went to sea as a smolt early in 1935 before starting to feed but that there was an interruption in its sea growth that summer, and that it did not put on any growth this year accounting for its small size.

RESTIGOUCHE HATCHERY

R. O. Barrett, Superintendent

An increased distribution of Atlantic salmon and speckled trout fry and fingerlings was made from this plant in 1936, amounting to over a million more than in 1935.

During the year one twenty foot circular pond was constructed and arrangements made for the installation of a small closed circulating system to test this method of incubation. The barn was converted into a garage for truck, and the stable made over for a fuel storeroom. Other improvements made consisted of the gravelling of roads and around outside tanks, grading of grounds, etc.

In February 1,000,000 Atlantic salmon eyed eggs were received from Kelly's Pond hatchery and in March 150,000 speckled trout eyed eggs from Antigonish hatchery. In the first part of July 12,000 speckled trout No. 1 fingerlings were transferred to the Miramichi hatchery for later distribution from that point. In March the following outgoing shipments of Atlantic salmon eyed eggs were made; 30,000 to Florenceville hatchery and 220,000 to Grand Falls hatchery. In the autumn 2,351,820 salmon ova were received from New Mills pond. Distributions for the season were: 2,632,832 Atlantic salmon and 104,063 speckled trout; total, 2,736,895.

SAINT JOHN HATCHERY, SAINT JOHN SALMON POND AND CHAMCOOK COLLECTING STATION

J. D. Nichol, Superintendent

The collection of speckled trout eggs from the Saint John trout ponds reached a high record of 2,283,286 in 1936, as against 1,543,078 collected in 1935. Other collections of eggs made at the hatchery ponds were: rainbow trout 2,500, brown trout hybrids 4,320 and landlocked salmon hybrids 2,300.

The usual distribution of fry, fingerlings, yearlings and older fish was made from the various species propagated at this plant. In November 3,000 Atlantic salmon green eggs were shipped to Doctor A. G. Huntsman, University of Toronto, for study by Professor Laurence Irving of the changes in protein during development and 3,000 to the Superintendent of State hatchery, Department of Fisheries and Game, Sandwich, Massachusetts. These latter eggs were shipped on request of Doctor David L. Belding, Boston University School of Medicine and will be studied by Mr. W. S. Hoar who is interested in following the early development of the salmon particularly in regard to the swim bladder and to the endocrine glands. Assistance in the distribution of hatchery product was rendered by the various fish and game protective associations, and fish and game wardens.

Live specimens of salmon and trout under the care of Superintendent Nichol were loaned to the Saint John branch of the New Brunswick Fish and Game Protective Association for showing at the Saint John Exhibition.

During the year the sewer draining ponds in series twenty to thirty-nine was renewed by a twenty inch wood stave pipe, the work being done by the hatchery staff. The wood slat gates installed in trout ponds the previous season gave entire satisfaction.

Supplies of eggs received from other sources in addition to collections were: in February 1,000,000 Atlantic salmon eyed eggs from Kelly's Pond hatchery; in March through an exchange agreement with the Department of Mines and Fisheries, Quebec, 15,000 ouananiche eyed eggs, and in the autumn 1,552,320 salmon ova from Saint John pond. Distributions for the year were: Atlantic salmon 1,584,397, brown trout hybrids 8,046, sebago salmon 2,784, Loch Leven trout 877, and speckled trout 808,092; total, 2,404,196. Of the above 773 Atlantic salmon two years and 10,000 speckled trout fingerlings were marked by the removal of the adipose and right pectoral fins, 2,000 sebago salmon yearlings by the adipose and right ventral fins, 784 sebago salmon two years by the adipose and left ventral fins, and 664 wild speckled trout of Rairdon brook stock by the right pectoral fin.

Commencing May 29 and ending July 28 Atlantic salmon for Saint John pond were accepted and impounded as caught on all but a few days during the receiving period—some 1,334 fish of fair size being secured. The loss of brood stock for the season was 19.4 per cent, as compared to 31 per cent the previous season when salmon were not accepted during and immediately preceding periods of high spring tides. The salmon stripped yielded 7,013,160 eggs, which were laid down at the following hatcheries: Florenceville 1,504,800, Grand Falls 2,197,800, Yarmouth 1,758,240 and Saint John 1,552,320.

The collection of landlocked or sebago salmon eggs at Chamcook lakes was under the direction of Assistant W. T. Owens of the Saint John hatchery. Sixty-two fish were captured in traps from October 21 to November 13, and consisted of 44 females and 18 males, from which 74,860 eggs were collected and laid down in the Saint John hatchery. Forty marked fish were captured approximately 8 inches in length and one-quarter of a pound in weight. These are returns of sebago salmon yearlings that were marked and liberated from the Saint John hatchery in 1935.

KELLY'S POND HATCHERY AND MORELL RIVER SALMON POND

F. C. Hayley, Superintendent

Kelly's pond hatchery in the autumn of 1936 collected more than twice as many wild speckled trout eggs as were taken during the previous year—the numbers being 550,800 in 1936 made up of 228,300 from Ing's pond, 36,200 from Watt's stream, 187,400 from Hardy's stream and 98,900 from Fortune river. In 1935 the collection was 211,422. While an increase was obtained from Ing's pond, the greater part of the increase was from Hardy's stream. The department laid down the eggs secured in their hatchery and when eyed the number that eye from Ing's, Watt's and Hardy's water systems will be paid for. A trap was operated by the department at Fortune river where 202 sea trout were captured from September 28 to November 21 and from which the collection above mentioned of 98,900 eggs was made.

The water supply for the hatchery has greatly improved following treatment last year with copper sulphate and lime. After distribution was completed in 1936 the pond was lowered and exposed portion of the bottom coated with quick lime to further check algal growth.

During the year a new garage was built for the hatchery truck, and repairs made to the hatchery dwelling.

In March 50,000 speckled trout eyed eggs were received from the Antigonish hatchery. From this lot 30,000 of the resultant fingerlings were marked by the removal of the adipose and left pectoral fins, and 28,000 liberated in the feeder stream of Webster's pond at Covehead and 2,000 above Coles pond at Milton.

In February shipments of 1,000,000 Atlantic salmon eyed eggs were made to Restigouche and Saint John hatcheries. In November 1,099,500 Atlantic salmon ova from Morell salmon pond, were laid down in addition to the speckled trout ova mentioned above.

Distributions for 1936 amounted to over five hundred thousand more than the previous year and were: Atlantic salmon 1,230,085, speckled trout 202,408; total 1,432,493.

Operations at the Morell salmon retaining pond were in charge of Assistant A. Tait. A new scow with a watchman's shanty was built and made ready at the beginning of operations. The run of salmon captured exceeded requirements and all surplus fish were released as soon as the necessary number of eggs to fill hatchery requirements had been secured. The number of salmon impounded was 343, taken from October 16 to November 6. The collection amounted to 1,099,500 eggs, which were laid down in Kelly's Pond hatchery.

WESTERN DIVISION

Following an investigation by the Biological Board the sockeye hatcheries in British Columbia (with the exception of Cultus lake where further study is being carried out) were closed as per Order in Council P.C. 518 dated March 2, 1936. Copy of the order follows:—

P.C. 518

CERTIFIED to be a true copy of a Minute of a Meeting of the Committee of the Privy Council, approved by the Deputy of His Excellency the Governor General on 2nd March, 1936.

The Committee of the Privy Council have had before them a Report, dated 21st February, 1936, from the Minister of Fisheries, submitting as follows:—

As it was not clear that the hatching of sockeye salmon in British Columbia was justifying the cost involved, it was decided in 1925 to have the Biological Board undertake a thorough investigation into the relative efficiency of artificial and natural reproduction of sockeye salmon, and at the time it was anticipated that it would take twelve years to complete it, but it found it possible to report finally in the premises at its recent annual meeting. The basis of determination as to the efficiency of reproduction in any year was the number of young fish that of their own volition left the lake for the sea. This young sockeye do in the second year of their age and they remain at sea until they reach maturity. The results of the investigation, which comprehend different methods of hatching and also the rearing of the young fish to various ages up to nearly one year are summarized in the following statement:—

Natural Reproduction	1925	1927	1930
Migrants as percentage of total eggs available.....	1.13	1.05	3.16
Artificial propagation with liberation of fry	1926	1929	1932
Migrants as percentage of total eggs available.....	3.93	2.38	1.71
Migrants as percentage of total eggs obtained from the adult salmon that were stripped.....	4.54	2.76	2.43
Artificial propagation with eyed egg planting	1928	1933	
Migrants as percentage of total eggs available.....	0.95	3.55(a)	
Migrants as percentage of total eggs obtained from the adult salmon that were stripped.....	1.44	4.67(a)	

(a) Indicates that possible two year old migrants of the 1936 migration have yet to be added.

In the light of the above, the following conclusion was reached by the Biological Board:—

“On the whole it may reasonably be concluded that in an area such as Cultus lake, where a natural run of sockeye occurs with a reasonable expectancy of successful spawning, artificial propagation, for purposes of continuing the run to that area, is unnecessary and, if producing any additional results over natural spawning, these would not appear to be in any way commensurate with the cost.

“This conclusion may not apply to areas where there is no reasonable expectation of successful natural propagation.”

The Minister observes that it was the hatching of sockeye salmon only that was in question, and the investigation does not reflect adversely on the hatching of trout and Atlantic salmon that is being carried on in different parts not only of Canada but of several countries in the world, the good effects of which so far as Canada is concerned, have already been reasonably established.

The following sockeye salmon hatcheries in British Columbia are being operated by the Department of Fisheries:—

Babine lake and Lakelse lake on the Skeena river; Rivers Inlet; Anderson lake and Kennedy lake on Vancouver Island; Cultus lake-Smith's Falls, Pitt lake, Harrison lake and Pemberton on the Fraser river.

In the light of the findings of the Board and as a natural run of salmon, with a reasonable expectancy of successful spawning occurs to all the areas in which the above named hatcheries are operated, the Minister, on the advice of the Deputy Minister of Fisheries, recommends that when the present season's operations in the above named hatcheries are completed, they be closed, and disposed of to the best advantage, and that the employees therein be then retired under the conditions provided by law.

The Committee concur in the foregoing recommendation and submit the same for approval.

(Sgd.) E. J. LEMAIRE,
Clerk of the Privy Council.

Most of the supplies and equipment of value or further use at the hatcheries scheduled to be closed were removed and stored at central points. Babine, Stuart, Lakelse and Rivers Inlet hatchery buildings were transferred to the Department of Indian Affairs; Gerrard, Anderson and Kennedy lake hatcheries to the Provincial Department of Lands, Victoria, British Columbia. Pitt lake establishment was sold through the Salvage Officer, Government Contracts Supervision Committee, and the Cultus lake, Harrison lake and Pemberton plants are not being disposed of at present. Due to abolition of positions the following permanent fish culture employees were superannuated or retired under conditions provided by law— Messrs. C. W. Harrison, T. W. Graham, J. W. Dalzell, C. Sayer, E. V. Epps, R. H. Eaton, W. L. Goodlet, Weldon R. Reid, J. McPhail, W. H. Billington, C. R. T. Hearn, Charles Raven, R. A. McRae, D. Bothwell, S. E. Carreck and B. H. Symns.

Water conditions were such in British Columbia in 1936 that many fry, fingerlings, yearlings and some old fish became stranded. These were rescued and transferred to suitable locations as shown in the following statement:—

From	To	District	Date	Length	Number	Species
Bowser creek.....		Comox.....		fry	300	210 coho salmon and 90 trout.
Capilano river.....	Capilano river.....	North Vancouver.....	July.....	2"	200	Coho salmon.
Chilliwack river.....	Chilliwack river.....	Chilliwack.....	October.....	2"	700	Cutthroat trout.
Demanuel stream.....		Victoria.....		fry	500	325 coho salmon and 175 trout.
Dunville creek.....	Dunville creek.....	Chilliwack.....	October.....	2"	500	Cutthroat trout.
Elk creek.....	Elk creek.....	".....	".....	2"	150	Cutthroat trout.
Fish creek.....	Bear lake.....	Kootenay.....	August 27.....	2" to 3"	55	Mountain Kamloops trout.
Goat river.....	Goat river.....	".....	August 1.....	3" to 6"	199	Cutthroat trout.
Gold creek.....	Gold creek.....	".....	August 12.....	2"	2,000	Cutthroat trout.
Kidd creek.....	Meadow creek.....	".....	August 1.....	2 1/2"	25	Speckled trout.
Little Sheep creek.....	Little Sheep creek.....	".....	August 5, 7-13.....	2 1/2" to 5"	1,119	Speckled trout.
Lorenzetta creek.....	Lorenzetta creek.....	Chilliwack.....	October.....	3"	600	Coho salmon.
Meadow creek.....	Meadow creek.....	Kootenay.....	August 1.....	2" to 3"	92	Speckled trout.
Monte lake.....	Monte lake.....	Kamloops.....	August.....	2" to 3"	6,500	Kamloops trout.
Moyie river.....	Palmer Bar creek.....	Kootenay.....	August 14.....	mature	34	Cutthroat trout.
Smith creek.....	St. Joseph creek.....	".....	August 8-13.....	mature	100	Cutthroat trout.
Upper Sumas river.....	Upper Sumas river.....	Chilliwack.....	October.....	3"	400	Cutthroat trout.
Vedder river.....	Vedder river.....	".....	".....	2"		Cutthroat trout.
					13,515	

An experiment in the introduction of brown trout to selected waters on Vancouver island was undertaken in 1931 by this department in co-operation with the staff of the Biological station at Nanaimo.

The Little Qualicum and the Cowichan rivers were stocked yearly from 1932 to 1936 with either brown or Loch Leven trout. In several years yearling trout were liberated and in the first two years many of the fish were marked by removal of the adipose fin. Brown trout have been reported from Cowichan lake and several specimens were caught this year near its head—one fish was reported as weighing four pounds. Last year a few fertile brown trout eggs were recovered from natural spawning in Oliver creek. Several specimens weighing up to a pound and a half have been caught near tidewater in the Little Qualicum. Several brown trout were caught in the tributaries not exceeding nine inches in length. It is understood that most of the anglers report the brown trout, as a game fish, slightly inferior to the native cutthroat. It has provided some angling nevertheless in the Cowichan river during the "off" summer season but the fish are not abundant enough yet to make this an important attraction.

Eggs supplied by this department were laid down in 1936 by the Provincial Game Board as follows:

At their Stanley Park Hatchery—25,000 steelhead trout eggs from Cultus lake and 250,000 Kamloops trout eggs from Penask lake hatchery; at Qualicum ponds—194,000 Kamloops trout eggs from Lloyd's creek hatchery; and at Veitch creek ponds—58,000 Kamloops trout eggs from Lloyd's creek hatchery.

The Kamloops trout eggs taken by the Provincial Game Board at the Beaver lake station were laid down as follows: 109,700 in Stanley Park hatchery and 128,653 in Veitch creek ponds.

As referred to in last report a test was made in 1934-35 of three methods of securing eggs from sockeye salmon. In the expression method the eggs are gently pressed from the ripe female; in the expression and incision method partial expression takes place, the fish is then killed, bled, cut open and the remaining eggs taken out. In the full incision method the fish is killed, bled, cut open and all eggs taken. The loss in incubated eggs using the first method averaged 2.9 per cent; using the second method 5.9 per cent and using the third method 3.3 per cent. The loss in eggs due to opening immature fish in the third method only amounted to 0.8 per cent of total eggs taken by this method.

The expression method leaves some eggs in the female but as shown in the 1934 report most of these are extruded naturally after the fish is released—the average as shown by the 1934 experiments being 83 per cent. Similar experiments were carried out by Doctor R. E. Foerster of the Biological Board a few years ago and it was reported that 14.5 per cent of the eggs were left in the female but that approximately 77 per cent of these were later deposited, leaving an ultimate loss of only 3.3 per cent. For the expression and incision method the losses in eggs unrecovered from the stripped females amounted to 2.2 per cent whereas for incision it was 2.65 per cent. Expression stripping required an average of 20.5 minutes to strip 25 females whereas expression and incision occupied an average of thirty minutes and incision took twenty-nine minutes. In the expression method and in the incision method one stripper was required whereas in the expression followed by incision method two strippers were needed, thus increasing the cost of using this method.

Forbidden Plateau lakes are situated in the vicinity of Courtenay and previous to stocking with Kamloops contained no fish. The results have been eminently satisfactory, resulting in many anglers being attracted each year; some fish are taken up to 6 pounds. Natural spawning took place in 1933. These plantings have been the source of very considerable gratification to the public in the vicinity of Courtenay and Comox.

Jones lake in the Hope district was barren previous to stocking with Kamloops trout in 1924. The results have been unusually good and there is an excel-

lent supply of beautiful trout which have reached as high as 18 pounds in weight. This lake has been an attraction to United States anglers as well as residents in British Columbia.

Paul and Pinantan lakes are in the vicinity of Kamloops and were barren until planted by this department. The result is that these lakes are now known all over North America for their excellent sport and many anglers come long distances to enjoy the fishing. Anglers from points as far as England, Honolulu, and China enjoy sport fishing at Paul and Pinantan lakes. The success has been outstanding.

Fish lake is also near Kamloops. At one time it provided unusually good fishing but due to the lowering of the level of the water, and over which circumstances the department had no control, the spawning grounds were dried up and the fish were caught or died off. By means of restocking each year the department has restored this valuable sportfish lake to its original state of productivity, and it has now resumed its reputation as one of the best sportfish lakes in the interior.

Knouff lake—the remarks regarding Paul lake largely apply to this one also. There is splendid fishing every year and good supplies of excellent trout are always available.

Murtle lake is in the Blue River district and is one which has shown remarkable results since stocking by this department with Kamloops trout. There is now an abundance of fish which have provided some excellent sport in recent years. The supply has been so good that the department decided to reserve the lake for fish cultural purposes, although it is probable that this procedure will have to be revised and angling permitted, in order that the individual size of the fish may be maintained.

Beaver lake in the Kelowna district is another outstanding success of the federal department and provides excellent sport for a great many anglers each year. Fish up to 18 pounds in weight are caught. The number of people visiting this lake is increasing each season, particularly from outside Canada. This lake was barren before stocking.

Jewel lake near Greenwood is another instance where, by means of planting Kamloops trout, the department has provided splendid fishing; the fish running from 10 to 12 pounds and in beautiful condition.

Wilson lake, near Nakusp, is a further instance, and conditions here have been most satisfactory since plantings were made. Specimens up to 15 pounds are caught.

Premier lake is near Cranbrook. One of the highlights in the federal department's fish culture is the success in the planting of this barren lake. Fish from 25 to 42 pounds have been taken, but the size is now somewhat smaller, although very satisfactory.

The total number of barren lakes and streams stocked in the Kootenay area, and more particularly in the vicinity of Cranbrook, is 116. The local inspector states, with few exceptions, that the plantings have been a complete success and the lakes now provide good sport fishing, notwithstanding the intensive fishing by residents and numerous tourists who come each year from across the international boundary.

In the Okanagan district the following barren lakes have been stocked with Kamloops trout, with results as shown: Davis, Glen, Echo, Preferle, Summit or Taylor, Silver, Neveau and Jackson lakes—good fishing; Boileen lake—overstocked; Chute, Pillar, and Peter Hope lakes—excellent fishing.

The Kamloops trout planted in the five lakes at Brandywine Falls have reached a good size in two years, being from a pound and a half to two pounds in weight. Good trout fishing was reported in Okanagan lake in 1936—fish being taken up to 14 pounds in weight.

During 1936 the Fish Culture Branch assisted the Biological Board in British Columbia financially to the extent of some \$4,900 in connection with surveys and research work it was doing at Nicomekl and Serpentine rivers, Paul and Okanagan lakes, pink salmon investigation at Queen Charlotte islands, Qualicum ponds, and in the furunculosis investigation.

ALBERTA

BANFF HATCHERY

J. E. Martin, Superintendent

Fish cultural operations at the Banff hatchery in 1936 were quite satisfactory, the progeny of six different species of trout from the eyed-egg stage to No. 4 fingerlings being planted in many lakes and streams in the district. Of the older fish retained several were loaned during the year for display purposes.

There was however, a falling off in the collection of speckled trout eggs from Upper Vermilion lake, which may be attributed to a great extent to the presence of mink, which have become fairly common about the lake, especially in the vicinity of the main spawning area. Two other spawning areas were frozen over before the season was completed. The total collection of this species was 104,000.

With the exception of speckled trout eggs collected locally and 100,000 Kamloops trout eyed eggs received from the Lloyd's creek hatchery, British Columbia, the eggs incubated at this establishment were obtained by exchange and purchase. The following eyed eggs were received during the year: Through exchange agreements 612,510 cutthroat trout from the United States Bureau of Fisheries and 104,160 salmon trout from the Department of Game and Fisheries (via Port Arthur hatchery), Ontario, and through purchase 504,529 Loch Leven trout from the United States Bureau of Fisheries; 469,800 cutthroat trout from the State Fish and Game Department, Anaconda, Montana; 709,660 rainbow trout from the Rainbow Ranch, Troy, Montana, and 102,000 and 153,387 speckled trout from the Trout Brook Company, Hudson, Wisconsin, and the Cape Cod Trout Company, Wareham, Mass., respectively.

The total distribution including fry resultant from eggs received in the fall of 1935, was: brown trout 456,510, cutthroat trout 1,022,320, Kamloops trout 95,590, rainbow trout 650,730, salmon trout 96,542, and speckled trout 256,630; total 2,578,322.

Leman lake at the headwaters of the upper Spray river was barren before being stocked with cutthroat trout. It now produces possibly the largest specimens of that species in any of the Park waters. Cutthroat taken in Marvel lake up to 13 inches are in good condition but those over that size appear under-nourished. The lower Kananaskis lake is well populated with large specimens of cutthroat and Dolly Varden trout. The Upper Kananaskis lake was stocked with rainbow in 1935, and in 1936 yearlings of that species from six to nine inches long were caught. Fishing was good on the Elbow river and specimens of rainbow from five to ten pounds were taken. The brown and Loch Leven trout are beginning to show in considerable numbers in tributaries of the Red Deer river but anglers find this species difficult to lure, and even when hooked are liable to escape as they are strong persistent fighters. Grant, Castle, Dennison and Spring creeks each has a good showing of these species. Low water conditions during 1936, however, in several of the streams in the Park were detrimental to fish life.

JASPER PARK HATCHERY

Good sport was enjoyed in the park by anglers during the fishing season. Shipments of rainbow trout eyed eggs, purchased from Rainbow Ranch, Troy, Montana, were received amounting to 650,700 and from which 603,703 fry were produced and distributed.

WATERTON LAKES HATCHERY

G. E. Bailey, Superintendent

A large number of visitors registered at the Waterton Lakes hatchery this season, showing that the general public are considerably interested in the work of this establishment. The grounds and buildings were maintained at their usual high standard of neatness and attractiveness during the year.

Crypt lake, first stocked with cutthroat trout in 1932, was opened for angling this season and provided excellent results. Good fishing was maintained throughout the summer and many anglers secured their limit. Specimens caught were of fine quality, nicely coloured and of good proportion. The Carthew lakes, Alderson lake and particularly Cameron lake together with other waters of the National Park provided a satisfactory fishing season.

An effort has been made to improve conditions in Blackiston or Pass creek by the construction of log and rock dams which have created satisfactory pools about four feet deep.

During the year the following supplies of eggs were secured from outside sources: 436,940 cutthroat trout from the United States Bureau of Fisheries, and 304,556 cutthroat trout and 815,166 rainbow trout from Rainbow Ranch, Troy, Montana.

Distributions for the season were: cutthroat trout 565,437; rainbow trout 643,145; total, 1,208,582.

FRASER RIVER WATERSHED

CULTUS LAKE HATCHERY

A. Robertson, Superintendent

At the commencement of the calendar year 1936 there were some 407,000 coho salmon eggs in the hatchery, being eggs from the previous fall collection and from which 393,600 fry were produced and distributed.

Good results were observed from the experiment commenced in November, 1935, when 53,284 water hardened sockeye salmon eggs were planted in prepared gravel beds in the creek formed by the overflow from the settling pond at the hatchery. From May 16 to June 5 the number of fry captured and counted as they rose from the gravel beds was 42,435, that is 79.6 per cent recovery. These fry were liberated in Sweltzer creek.

The run of steelhead salmon to Sweltzer creek in 1936 showed an improvement over previous years. The total collection of ova was 418,000 as compared with 137,400 taken here in 1935 and 125,163 taken in 1934. The period of collection was March 21 to May 8. The disposal of these eggs less normal losses may be summarized, as follows: in May 25,000 eyed eggs to the Provincial Game Board's hatchery at Stanley Park and in May and June 248,900 eyed eggs to Smiths Falls hatchery; in July 94,069 distributed in Sweltzer creek, and on November 6 the remainder 9,019, to Smiths Falls hatchery. In addition to the above collection the ornamental pool at the hatchery produced 31,836 steelhead eggs from April 18 to May 23. Small lots of these eggs were transferred daily as taken to the Smiths Falls hatchery; a total of 7,936. Of the steelhead eggs laid down at the Cultus lake hatchery from the fountain pool

12,530 were transferred on June 2 in the eyed stage to the Smiths Falls hatchery. The remainder were hatched and the resultant fry fed during the summer, being distributed in the No. 1 fingerling stage in July. The number produced less losses was 8,983. It was planned to hold and feed the progeny of the 418,000 steelhead salmon eggs taken but unfortunately the food, which had proved satisfactory for the larger fish, was unsuitable for the fry and they were released at the No. 1 fingerling stage.

This food consisted of a mixture of frozen salmon, frozen salmon eggs and salmon livers, dried milk and milk residue, the latter being a pasty by-product of the dried milk factory.

Some 39 young cutthroat trout caught in Sweltzer creek and retained in a tank at the hatchery were stripped and yielded 4,760 eggs between April 28 and May 20. In May and June 25,128 cutthroat trout green eggs were purchased from Mr. Oliver N. Wells, Sardis. The fry resultant from this species were retained and distributed in the advanced fry stage on July 10. The number of fish distributed from the former was 3,922 and from the latter 14,521.

A collection of 1,087,000 coho salmon eggs, exceeding that of the previous year by 667,000, was made, using the full incision method, from December 8, 1936, to February 18, 1937.

In addition to local collections, 70,000 Kamloops trout eyed eggs were received from the Lloyd's Creek eyeing station on June 10 and 17. These were retained to the fry stage and widely distributed in waters in the district. The yield was 69,460.

An innovation in hatchery procedure was carried on this year, which was the freezing of stripped salmon, chiefly coho and sockeye, for fish food. Some fourteen tons of this food was boxed and shipped to New Westminster for storage to be later used as required. For the larger fish this mixture is put through a grinding plate with one-half inch holes, and even the vertebrae bones are devoured.

Between November 13 and December 30 some 17,377,000 sockeye salmon eggs were secured from parent fish captured in Sweltzer creek. These eggs were laid down in the Smiths Falls hatchery for incubation.

The distributions for the calendar year were: coho salmon 393,600, cutthroat trout 18,443. Kamloops trout 69,460, sockeye salmon 42,435, and steelhead salmon 128,052; a total of 651,990.

Through gill nets, seines, set lines and traps the Biological Board have removed from Cultus lake the following: 20,552 squawfish, 453 Dolly Varden char, 915 trout, 999 coho, 2,455 sculpins, 15,925 sticklebacks, 2,344 suckers, 14 chubs, 24 Rocky Mountain whitefish and 35,847 shiners, or a total of 79,528 fish. The presence of so many predators and food competitors is significant in the bearing it would have on the number of migrating sockeye counted as they left the lake during the course of the sockeye salmon investigation.

SMITHS FALLS HATCHERY

A small loss of fifty-one occurred during the year out of 5,816 cutthroat trout yearlings held in the ponds at the Smiths Falls hatchery. These fish have never shown any signs of sickness and the above losses were due chiefly to accident. At the end of the year they ranged from nine to fifteen inches in length. On week ended June 13 ten thousand steelhead salmon fingerlings were selected from the steelhead stock on hand with the intention of holding them for breeding purposes, and the remainder were liberated. At the end of the year, after deducting a normal loss, 9,932 of these were in the ponds.

It was planned to rear a great number of steelhead salmon of the current year's collection but the food combination, which did not include beef liver, was found unsuitable. The following supplies of steelhead salmon were received

from the Cultus Lake hatchery during the year: from the fountain pool 7,936 green eggs received daily as collected, and 12,530 eyed eggs; of the Sweltzer creek stock 248,900 eyed eggs and 9,019 No. 3 fingerlings.

In November and December 17,377,000 sockeye salmon eggs from Cultus Lake hatchery were laid down for incubation.

Distributions consisted of 64,281 cutthroat trout and 290,729 steelhead salmon, making a total of 355,010. Of the above, 15,000 steelhead yearlings were marked by the removal of the adipose fin.

MURTLA LAKE CAMP

F. A. Tingley, Officer in Charge

Steps were taken in 1936 to investigate (as a source of supply for Kamloops trout eggs) possibilities at Murtle lake, which is tributary to the North Thompson via Clearwater river, and situated about fifteen miles west of the town of Blue River. Following a preliminary trip to the lake, preparations for the taking of fish commenced on April 23. The main fence and trap were installed in Trap creek, a second in the stream draining Round and Phyllis lakes, and a third in the stream immediately below the outlet of above-mentioned lakes. The number of parent fish captured in these traps from May 23 to June 16 was 112, which yielded 126,862 eggs. A raft and two eyeing floats to accommodate sixty baskets were built in Round lake and moored in the light current flowing from Phyllis lake. Some 69,000 eggs laid down in these floats were a total loss, due to a disturbance caused by a large school of yearling trout that swarmed around the floats. As a result of egg losses in Round lake a raft and new floats were constructed in Blue lake, in which 57,862 eggs were laid down and eyed. The number of eyed eggs distributed was 43,820, of which 25,721 were planted in Blue river above the falls, and 18,099 in lake Eleanor. In an effort to secure a further collection a net was set in Stevens river, but without success.

A careful study was made of spawning grounds in the tributaries of Murtle lake and especially Bannock creek. Few fish were seen, except in Bannock creek where an abundance of trout were observed on the gravel bars near its mouth.

PEMBERTON HATCHERY

T. W. Graham, Superintendent

The distribution of sockeye fry resultant from the 1935 collection commenced on April 20, 1936 and continued until June 20, by which time 23,493,960 had been liberated in the usual way by allowing them to leave the troughs when so inclined and pass through the ponds to the Birkenhead river, the parent stream.

In June, 347,500 Kamloops trout eyed eggs were received from Lloyd's creek station. From these, 197,500 eyed eggs and 147,170 fry were distributed. The total distribution for the season was 23,838,630. This year a planting of Kamloops trout eggs was made in Evans lake, in the Squamish area, contiguous to the Pacific Great Eastern railway and when examined later, lively fry were everywhere in evidence from a little above the spawning beds right down to the lake water. This lake was previously barren of fish life.

PITT LAKE HATCHERY

R. H. Eaton, Superintendent

The largest number of sockeye salmon ever known to return to the spawning grounds returned this year, which should well seed this area as there were no floods to destroy the eggs.

The total distribution of sockeye fry resultant from the fall collection of 1935 was 2,879,380.

DEPARTMENT OF FISHERIES

VANCOUVER ISLAND

ANDERSON LAKE HATCHERY

D. Bothwell, Superintendent

At the commencement of the calendar year 1936 there were some 5,211,748 sockeye salmon eggs in the hatchery. From these a successful distribution of 5,090,972 fry was made in the tributaries of Anderson lake.

KENNEDY LAKE HATCHERY

W. P. Forsythe, Superintendent

All fry resultant from the 1935 sockeye salmon egg collection were transferred from the hatching troughs to the retaining ponds, fed for some two weeks and given a widespread distribution in different sections of Kennedy river and lake and Muriel lake. The output for the year was: 1,453,725 eyed eggs, 4,951,525 advanced fry and 2,408,669 No. 1 fingerlings; a total of 8,813,919 sockeye salmon.

An experiment in incubation of green sockeye eggs was carried out. Two lots of 30,000 eggs were used; the first lot being planted in prepared gravel hatching beds and the second cared for in the hatchery troughs. The first lot produced 26,662 free swimming fry or an 88.9 per cent yield, and the second after deducting a loss of 92 fry before the free swimming stage, produced 29,428 free swimming fry or a 98.1 per cent yield.

Sockeye eggs deposited naturally in Muriel lake in the fall of 1935 were examined later and found in good condition with the exception of those spawned in the mouths of David and Donald creeks, two main streams, where some smothering was observed.

All spawning grounds were well seeded generally in 1936 including the lake shore beaches of Clayoquot Arm and Cold creek. Upper Clayoquot river had a much better-than-average seeding, and there was an increased run of sockeye to the upper Kennedy river. Spawning conditions were excellent during the heaviest seeding period. There was also a considerable run of sockeye to Muriel lake again this season.

During the week preceding July 11, heavy rains occurred in the Kennedy lake area resulting in high water in the river and during that period a school of sockeye numbering 1,000 ascended the rapids and arrived at the beach adjacent to the hatchery buildings.

It is unusual for sockeye to ascend to Kennedy lake at that time and the fish were fresh run from the sea. High water and a lowering temperature, 61°, was probably the reason for the fish entering the lake so early.

COWICHAN LAKE HATCHERY

F. A. Tingley, Superintendent

The loss in spring salmon eggs from the 1935 collections was excessive, being 48.5 per cent. This was due chiefly to the abnormally low water temperature that existed in the hatchery during and immediately after the taking of eggs. This explanation of the loss is substantiated by Dr. G. C. Embury in his article published in "Fish Culture" dated January 1936, in which he states that "with lower temperatures the tender stage of the eggs is prolonged to such an extent that losses almost invariably increase as the temperature is lowered". The majority of the fish taken were marked with abrasions, probably the result of fighting their way over the falls in the low water that prevailed during the run. Such injuries, would no doubt, affect the quality of the eggs.

Fishing for parent steelhead salmon in the Cowichan river was commenced on January 6. The river was unusually low for collections. At the commencement of the season fishing was poor and became worse with the fall of the water level. Although the run of steelhead was small in the upper section of the river, sportsmen reported the run unusually heavy in the section below the falls which was probably due to the low stage of water in the river preventing the ascent of the fish over Skutz Falls in normal numbers. The taking of steelhead was terminated on March 5, the total capture being 227, and the ratio of males to females about two to one. Sixty-two females and seventy-five males were stripped and produced 147,352 eggs. These were laid down in the Cowichan lake hatchery with a loss of 6.5 per cent to March 31.

The collection of spring salmon eggs on November 6, 1935 was blended and divided into two lots for comparison as between river and hatchery water for incubation. These lots contained 18,636 and 16,810 for the river and hatchery respectively and the respective temperatures were 50° and 39° F. on the day the eggs were laid down. The hatchery lot was turned into the baskets without previous lowering of temperatures. The eggs in the river developed very rapidly and were eyed on December 3 while the control lot in the hatchery was not eyed until December 28. The eggs in the river were transferred to the hatchery on December 27 when the river temperature was 45° F and the hatchery 44° F. The river lot were all hatched on January 25 with a loss of 13.4 per cent. The loss from the control group to this date was 30.9 per cent.

On March 31, 1935, this hatchery was placed under the management of the officers of the Biological Board to become a part of the sport fish research work being carried on by the Board. It was financed that year by the Fish Culture Branch but on April 1, 1936 this responsibility was assigned to the Board. Stock in the hatchery at this date was 139,150 spring salmon fry and 137,666 steelhead salmon eyed eggs.

SKEENA RIVER WATERSHED

BABINE LAKE HATCHERY

W. R. Reid, Officer in Charge

Sockeye salmon fry resultant from the 1935 collection at Babine Lake hatchery were successfully distributed in Morrison lake and creek, which is tributary to Babine lake, and consisted of 6,149,736.

A comfortable cabin for the officer in charge as an office and living quarters was constructed during the year. A small cabin built by the hatchery staff at the head of Morrison lake during the early years of hatchery operations and at times temporarily used by Indians was destroyed by fire.

LAKELSE LAKE HATCHERY

C. R. T. Hearn, Superintendent

All active fish cultural operations at the Lakelse lake hatchery terminated in November, 1935, owing to abnormal freshets which disrupted the water supply. The hatchery was in charge of a caretaker until disposed of in 1936.

DEPARTMENT OF FISHERIES

MAINLAND WEST COAST

RIVERS INLET HATCHERY

C. R. T. Hearn, *Superintendent*

The distribution of sockeye resulting from the 1935 collection was 17,919,477 consisting of 7,459,530 eyed eggs and 10,459,947 fry. All plantings were made into Owikeno lake and tributary waters.

SPORT FISH OPERATIONS—SOUTHERN INTERIOR

NELSON HATCHERY

A. P. Hills and P. B. Stratton, *Officers in Charge*

The distribution from this hatchery in 1936 was 2,081,429, consisting of 850,052 Kamloops trout, 986,501 Kennerly's salmon, and 244,876 speckled trout.

From 1,401 speckled trout fingerlings held in a small rearing tank inside the hatchery, there was a loss of 55 during the year leaving on hand at the end of the year 1,346, ranging from $2\frac{1}{2}$ to $4\frac{1}{2}$ inches in length.

In May, 58,500 Kamloops trout eggs were collected at Cottonwood lake and in the fall 1,582,000 Kennerly's salmon ova at Kokanee creek. These eggs were all laid down in the Nelson hatchery for incubation.

Some 853,000 Kamloops trout eggs were received from Penask lake hatchery in June and July.

Fishing was very good this season in Kootenay lake and river and generally throughout the district, particularly in Wheeler, Beatrice, Loon, Tanal and Leviathan lakes, and Wilson creek and lake, all of which were previously barren of fish life. It is reported that Kokanee eyed ova originally taken in tributaries of Kootenay lake 1932 and planted in Wilson and Christina lakes, were a complete success and that the progeny adopted similar spawning habits to the Kokanee or redbfish of Kootenay lake. The native Kokanee of Christina lake are beach spawners.

ARGENTA HATCHERY

H. G. Corder, *Officer in Charge*

This sub-station was operated on the same site as last year, and consists of a small outdoor hatching station of a temporary nature for the propagation of trout for distribution to Kootenay lake. Hatchery troughs and equipment are set up at the beginning of the season and the equipment dismantled and stored in a building on private property for the winter months.

In June, 500,000 Kamloops trout eyed eggs were received from Penask lake hatchery and the fry produced, viz. 437,260, were distributed in the upper or north end of Kootenay lake.

PENASK LAKE HATCHERY

R. H. Eaton and J. W. Dalzell, *Officers in Charge*

The weather conditions were very favourable for collection this season and there was an abundance of parent trout. From 6,775 females and 6,888 males 3,997,000 Kamloops trout eggs were secured—some 3,863,000 being obtained from Penask lake, and 134,000 from Spahomin creek. Transfers of eyed eggs to other establishments were: 1,315,000 to Summerland; 853,000 Nelson; 500,000 Argenta,

350,000 Cranbrook; and 250,000 to the Provincial Game Board, Stanley Park. Distributions for the season were : 630,000 eyed eggs which includes shipments made to the Cranbrook hatchery and the Provincial Game Board and 589,758 fry; a total output of 1,219,758.

SUMMERLAND HATCHERY

R. H. Eaton, Superintendent

As no collections of ova are made at this hatchery, it depends entirely on its supply from an outside source which this year was Penask lake hatchery, and supplied it in June and July with 1,315,000 Kamloops trout eyed eggs. The total distribution for the year was 1,290,023, consisting of 725,000 eyed eggs and 565,023 fry planted in waters tributary to Okanagan, Shuswap and Similkameen rivers.

LLOYD'S CREEK HATCHERY

A. P. Hills, Superintendent

The run of parent fish to Paul and Pinantan creeks was unusual, inasmuch as the fish commenced moving three or four days before the ice had gone out, whereas, the run ordinarily begins approximately one week after the lakes are clear of ice. Although the collection of Kamloops trout eggs at Knouff lake was only 150,000, as compared with 513,000 the previous year, the comparatively small collection at this point was due to damage to the fence which allowed parent fish to escape upstream. The spawning run at Fish lake was up to the average for the past four or five years. Egg collections in 1936 amounted to 3,791,000, which is an increase of 718,750 over 1935. The following is the yield of Kamloops trout eggs from the different waters where collections were made: Fish lake 1,274,000; Knouff lake 150,000; Paul creek 1,419,500, and Pinantan creek 947,500. At Paul creek in 1936 the number of fish stripped was 2,033 yielding 1,419,500 Kamloops trout eggs as compared with 1935 when 393 fish were stripped and 388,000 eggs secured. In 1935 all fish were counted over the Biological Board's fence and some subjected to handling, weighing, tagging, scale removal, etc., by the Biological Board before they reached the department's traps. In 1936 approximately 900 were counted over the Biological fence but over 200 fish had entered the hatchery trap and a large number were already in the creek before the fence was placed in commission. Also after the fence was installed this season, owing to high level of Paul lake, fish were able to pass around it. In 1935 some 1,328 fish were tagged by officers of the Board and of these, 16 were recovered in 1936.

A run of parent trout was observed spawning naturally in the outlet creek at Knouff lake and from which there was a large production of fry.

Through an exchange agreement with the Provincial Department of Game and Fisheries, Ontario, 100,000 eyed eggs were sent their hatchery at Brantford. Eyed eggs were also shipped to the following hatcheries: Pemberton 347,500, Cultus lake 70,000 and Banff 100,000.

Distributions for the season were: 1,929,000 eyed eggs and 897,735 fry; a total output of 2,826,735. The above includes allotments of eyed eggs, as follows: to the Revelstoke Rod and Gun Club, Biological Station, Taft, 120,000; to Vancouver Highlands 1,000, and to the Provincial Game Board at Qualicum ponds 194,000 and at Veitch creek retaining ponds 58,000. Fry sold during the year were: 1,000 to Mr. Alex. Philip, Kamloops; 2,000 to Gardner Lake Fishing Club, Salmon Arm, and 1,000 to Mr. A. T. Johnston (Eagle Bay), Notch Hill.

Excellent fishing was available in lakes throughout the Kamloops and Shuswap districts and sport fishing throughout the district was again very good generally this season. Satisfactory showings of yearlings were observed in waters stocked during the season of 1935, particularly in Andy and McConnell lakes which were previously barren of fish life.

BEAVER LAKE EYEING STATION

R. A. McRae, Officer in Charge

The collection of Kamloops trout eggs at this station in 1936 was 978,520. These were laid down in hatching troughs in Echo creek resultant from which 920,758 were distributed, consisting of 443,438 eyed eggs and 477,320 fry. The distributions were all made in the district; 150,000 eyed eggs and 185,760 fry going to the Kelowna Rod and Gun Club and the balance to Beaver lake and tributaries.

At Dee lake, 100,470 eggs were planted in gravel in troughs supplied and attended to by Mr. D. Sexsmith, who has a fishing camp on the lake. A trough was installed to catch the fry as they emerged from the gravel, after which they were distributed to different parts of Dee lake. Mr. Sexsmith also supplied a boat free of charge for the distribution of fry to the upper lakes and rendered much valuable assistance toward the operations at this station.

During the year a new dam was constructed on Echo creek.

In addition to the eggs collected by the Department, the staff assisted the officers of the Provincial Game Board in collecting some 366,000 eggs which were laid down and eyed in rearing ponds at Kelowna and then shipped to their hatchery at Stanley Park and their ponds at Veitch creek.

STATEMENT BY SPECIES, OF LOCAL COLLECTION AND DISPOSAL OF EGGS DURING 1936

Species	Collection area	Number collected	Disposal—Establishment at	Number	Totals
Atlantic salmon.....	Margaree pond, N.S. Nictaux pond, N.S. River Philip, N.S. Sackville river, N.S. Miramichi pond, N.B. New Mills pond, N.B. Saint John Pond, N.B.	3, 201, 500 514, 700 3, 579, 940 1, 030, 000 8, 957, 972 2, 351, 820 7, 013, 160	Margaree..... Middleton..... Cobequid..... Bedford..... Miramichi..... Restigouche..... Yarmouth..... Florenceville..... Grand Falls..... Saint John..... Kelly's pond..... Saint John..... Cultus lake..... Cultus lake..... Yarmouth..... Beaver lake..... Beaver lake..... Beaver lake..... Lloyd's creek..... Lloyd's creek..... Lloyd's creek..... Murtle lake..... Murtle lake..... Penask lake..... Penask lake..... Nelson..... Nelson..... Saint John..... Bedford..... Bedford..... Saint John..... Antigonish..... Antigonish..... Yarmouth..... Saint John..... Smiths Falls..... Antigonish..... Antigonish.....	3, 201, 500 514, 700 3, 579, 940 1, 030, 000 8, 957, 972 2, 351, 820 1, 758, 240 1, 504, 800 2, 197, 800 1, 552, 320 1, 099, 500 4, 320 1, 087, 000 4, 760 11, 000 463, 760 115, 600 399, 160 1, 274, 000 150, 000 1, 419, 500 947, 500 126, 862 3, 863, 000 134, 000 58, 500 1, 582, 000 74, 860 36, 000 22, 000 2, 300 8, 985 192, 000 2, 500 17, 377, 000 5, 973 (b) 3, 475, 046 (b) 1, 450, 096 (b) 481, 600 81, 870 8, 200 160, 500	27, 748, 592 4, 320 1, 087, 000 4, 760 11, 000 463, 760 115, 600 399, 160 1, 274, 000 150, 000 1, 419, 500 947, 500 126, 862 3, 863, 000 134, 000 58, 500 1, 582, 000 74, 860 36, 000 22, 000 2, 300 8, 985 192, 000 2, 500 17, 377, 000 5, 973 (b) 3, 475, 046 (b) 1, 450, 096 (b) 481, 600 81, 870 8, 200 160, 500
Brown trout (hybrids).....	Morell river, P.E.I.	1, 099, 500	Kelly's pond.....	1, 099, 500	27, 748, 592
Coho salmon.....	Saint John hatchery ponds, N.B.	4, 320	Saint John.....	4, 320	4, 320
Cutthroat trout.....	(a) Sweltzer creek, Cultus lake, B.C.	1, 087, 000	Saint John.....	1, 087, 000	1, 087, 000
Kamloops trout.....	Cultus lake hatchery (tank), B.C.	4, 760	Cultus lake.....	4, 760	4, 760
	Yarmouth hatchery ponds, N.S.	11, 000	Yarmouth.....	11, 000	
	Beaver creek, B.C.	463, 760	Beaver lake.....	463, 760	
	Crooked creek, Beaver lake, B.C.	115, 600	Beaver lake.....	115, 600	
	Echo creek, Beaver lake, B.C.	399, 160	Beaver lake.....	399, 160	
	Fish lake, Kamloops, B.C.	1, 274, 000	Lloyd's creek.....	1, 274, 000	
	Knouff lake, Kamloops, B.C.	150, 000	Lloyd's creek.....	150, 000	
	Paul creek, Kamloops, B.C.	1, 419, 500	Lloyd's creek.....	1, 419, 500	
	Pinantan creek, Kamloops, B.C.	947, 500	Lloyd's creek.....	947, 500	
	Murtle lake, Blue river, B.C.	126, 862	Murtle lake.....	126, 862	
	Penask creek, Nicola Valley, B.C.	3, 863, 000	Penask lake.....	3, 863, 000	
	Spahamin creek, Nicola Valley, B.C.	134, 000	Penask lake.....	134, 000	
	Cottonwood lake, Nelson, B.C.	58, 500	Nelson.....	58, 500	8, 962, 882
Kennerly's salmon.....	Kokanee creek, B.C.	1, 582, 000	Nelson.....	1, 582, 000	1, 582, 000
Landlocked salmon (sebago)	Chamcook lake, N.B.	74, 860	Saint John.....	74, 860	
	Grand lake, N.S.	36, 000	Bedford.....	36, 000	
	Grand lake rearing ponds, N.S.	22, 000	Bedford.....	22, 000	132, 860
Landlocked salmon (hybrids)	Saint John hatchery ponds, N.B.	2, 300	Saint John.....	2, 300	2, 300
Rainbow trout.....	Antigonish hatchery ponds, N.S.	8, 985	Antigonish.....	8, 985	
	Yarmouth hatchery ponds, N.S.	192, 000	Yarmouth.....	192, 000	
	Saint John hatchery ponds, N.B.	2, 500	Saint John.....	2, 500	203, 485
Sockeye salmon.....	Sweltzer creek, Cultus lake, B.C.	17, 377, 000	Smiths Falls.....	17, 377, 000	17, 377, 000
Speckled trout.....	Antigonish hatchery ponds, N.S.	5, 973	Antigonish.....	5, 973	
	Margaree hatchery ponds, N.S.	(b) 3, 475, 046	Antigonish.....	(b) 3, 475, 046	
		(b) 1, 450, 096	Antigonish.....	(b) 1, 450, 096	
		(b) 481, 600	Margaree.....	(b) 481, 600	
	Hart lake, Colchester and Cumberland Cos., N.S.	81, 870	Cobequid.....	81, 870	
	Poison lake, Cumberland Co., N.S.	8, 200	Cobequid.....	8, 200	
	Sand lake, Annapolis county, N.S.	160, 500	Middleton.....	160, 500	

STATEMENT BY SPECIES, OF LOCAL COLLECTION AND DISPOSAL OF EGGS DURING 1936—Concluded

Species	Collection area	Number collected	Disposal—Establishment at	Number	Totals
Speckled trout— <i>Conc.</i>	Yarmouth hatchery ponds, N.S.....	280,000		336,000	
		(b) 56,000	Yarmouth.....		
	Florenceville hatchery ponds, N.B.....	1,657,713		1,709,623	
		(b) 51,910	Florenceville.....		
	Saint John hatchery ponds, N.B.....	1,993,946		2,283,286	
Steelhead salmon.....	Fortune river, P.E.I.....	(b) 289,340	Saint John.....	98,900	
	Vermilion lake, Alberta.....	(c) 98,900	Kelly's pond.....	104,000	
	Cowichan river, B.C.....	147,352	Banff.....	147,352	
	Sweitzer creek, Cultus lake, B.C.....	418,000	Cowichan lake.....	418,000	
	Cultus lake hatchery, fountain pond, B.C.....	31,836	Cultus lake.....	23,900	
			Smiths Falls.....	7,936	
					597,188
					73,865,189

(a) Includes 201,000 eggs collected January and February 1937.

(b) Eggs from yearling fish.

(c) Sea-run variety.

EYED EGGS PURCHASED IN 1936

Species	Month laid down	Purchased from	Laid down in hatchery	Number received	Total by species
Cutthroat trout.....	May, June..... June..... July.....	Oliver N. Wells, Sardis, B.C..... (a) Rainbow Ranch, Troy, Montana..... (a) State Fish and Game Department, Anaconda, Montana.....	Cultus lake..... Waterton lakes.....	25,128 304,556	
Loch Leven trout.....	December.....	(a) United States Bureau of Fisheries.....	Banff.....	469,800	799,484
Rainbow trout.....	April..... May..... April..... May..... May..... May, June..... November, December.....	(a) Rainbow Ranch, Troy, Montana..... (a) Rainbow Ranch, Troy, Montana..... (a) Rainbow Ranch, Troy, Montana..... (a) Rainbow Ranch, Troy, Montana..... (a) Rainbow Ranch, Troy, Montana..... (a) Rainbow Ranch, Troy, Montana..... American Fish Culture Company, Carolina, Rhode Island..... American Fish Culture Company, Carolina, Rhode Island..... American Fish Culture Company, Carolina, Rhode Island..... American Fish Culture Company, Carolina, Rhode Island.....	Banff..... Banff..... Banff..... Banff..... Jasper Park..... Jasper Park..... Waterton lakes..... Bedford..... Middleton..... Grand Falls.....	504,529 101,722 607,938 449,820 200,880 815,166 1,000,000 1,545,000 1,000,000	504,529
Speckled trout.....	December..... November, December..... December..... December..... October, November..... November, December..... November, December..... November, December..... November, December.....	American Fish Culture Company, Carolina, Rhode Island..... Cape Cod Trout Co., Wareham, Mass..... (a) Trout Brook Co., Hudson, Wis..... Donald Fraser, Plaster Rock, N.B..... Earl Ings, Mount Herbert, P.E.I..... Harold Taylor, Little York, P.E.I..... Harold Watts, Little York, P.E.I.....	Yarmouth..... Banff..... Banff..... Grand Falls..... Kelly's Pond..... Kelly's Pond..... Kelly's Pond.....	1,644,500 153,387 102,000 1,290,000 222,000 185,500 35,500	2,175,526 7,177,887
				35,500	10,657,426

(a) Purchased by the Department of Lands and Mines, Edmonton, Alberta.
Summary of eggs received: Total eggs collected, 73,865,189; total eggs purchased, 10,657,426; total, 84,522,615.

EXCHANGED EYED EGGS RECEIVED 1936

From United States Bureau of Fisheries, in exchange for Atlantic salmon:	
Cutthroat trout from Yellowstone Park, Wyoming, U.S.A., laid down as follows:—	
Banff hatchery.....	612,510
Waterton Lakes hatchery.....	436,940
From Department of Game and Fisheries, Toronto, Ontario, in exchange for Kamloops trout:—	
Salmon trout from Belleville hatchery, laid down at Middleton hatchery.....	100,000
Salmon trout from Port Arthur hatchery, laid down at Banff hatchery.....	104,160
From Department of Mines and Fisheries, Quebec, in exchange for speckled trout:	
Ouananiche from hatchery at St. Alexis des Monts, laid down at Saint John hatchery.....	15,000

IN THE INTEREST OF ECONOMY AND CONVENIENCE IN THE DISTRIBUTION OF FRY
THE FOLLOWING TRANSFERS OF EYED EGGS WERE MADE IN 1936

Species	From	To	Number	Date received
Atlantic salmon.....	(a) Bedford.....	Yarmouth.....	1,000,000	March 7
	(a) Margaree.....	Lindloff.....	750,000	April 7
	(a) Miramichi.....	Antigonish.....	2,750,000	March 28
	(a) Miramichi.....	Florenceville.....	1,500,000	March 13
	(a) Miramichi.....	Grand Falls.....	500,000	March 12
	(a) Restigouche.....	Florenceville.....	30,000	March 7
	(a) Restigouche.....	Grand Falls.....	220,000	March 6
	(a) Kelly's Pond.....	Restigouche.....	1,000,000	February 6
	(a) Kelly's Pond.....	Saint John.....	1,000,000	February 13
	(b) Lloyd's creek.....	Banff.....	100,000	July 5
Kamloops trout.....	(b) Lloyd's creek.....	Cultus lake.....	70,000	June 10, 17
	(b) Lloyd's creek.....	Pemberton.....	347,500	June 11, 17
	(b) Penask lake.....	Argenta.....	500,000	June 28
	(b) Penask lake.....	Nelson.....	853,000	June 17, 27, July 1
	(b) Penask lake.....	Summerland.....	1,315,000	June 8, 20, July 3
	(b) Penask lake.....	Grand lake.....	21,000	March 24
Landlocked salmon.....	(a) Bedford.....	Smiths Falls.....	261,430	May 26, June 2
Steelhead salmon.....	(b) Cultus lake.....	Bedford.....	1,000,000	February 13
Speckled trout.....	(a) Antigonish.....	Lindloff.....	250,000	April 7
	(a) Antigonish.....	Middleton.....	700,000	March 14
	(a) Antigonish.....	Yarmouth.....	900,000	March 21
	(a) Antigonish.....	Restigouche.....	150,000	March 30
	(a) Antigonish.....	Kelly's Pond.....	50,000	March 23
	(a) Florenceville.....	Grand Falls.....	597,126	March 4

(a) 1935 fall collection.

(b) 1936 collection.

MARKING OF FISH

The marking of Atlantic salmon handled for fish cultural purposes, which commenced in 1913, was continued in 1936 at Margaree, Nictaux, River Philip and Sackville river ponds, Nova Scotia. Atlantic and sebago salmon, speckled and salmon trout of various ages in the east and steelhead salmon yearlings in the west were marked by clipping of fins. The object of tagging the Atlantic salmon was to throw some light on the movements of the fish in the sea, frequency in spawning and the extent to which early fish of any season return as early fish or vice versa. Marking by fin clipping was practised to give information on movements, growth and survival of hatchery product. The extent of marking is shown in the following statement:—

	Number marked	Species	Stage of development	Liberated	Nature of mark
<i>Nova Scotia</i> — Margaree pond..... Nictaux Falls pond..... River Philip pond..... Sackville river pond..... Antigonish hatchery..... Grand Lake rearing ponds..... Lindloff hatchery..... Margaree hatchery.....	193	Atlantic salmon.....	Adults.....	Margaree pond.....	Silver tag attached to dorsal fin.
	92	"	"	Nictaux river.....	"
	200	"	"	River Philip.....	"
	97	Speckled trout.....	Fingerlings.....	Sackville river.....	Removal of adipose and right pectoral fins.
	3,100	"	Yearlings.....	Long lake, East river St. Mary	"
	500	"	"	Copper lake.....	"
	500	"	"	Glenroy river.....	"
	500	"	"	Meadow Green river.....	"
	1,000	"	"	South River lake.....	"
	1,000	"	"	West river.....	"
	1,300	"	Old fish.....	"	"
	135	Sebago salmon.....	Two years.....	Grand lake.....	Removal of adipose and right ventral fins.
	16	"	Wild.....	"	"
	15,000	Atlantic salmon.....	Fingerlings.....	Salmon river.....	Removal of adipose and left pectoral fins.
	24,234	Atlantic salmon.....	"	Northeast Margaree river.....	Removal of adipose and right pectoral fins.
Middleton hatchery..... Nictaux Falls rearing station..... Yarmouth hatchery.....	695	Speckled trout.....	Yearlings.....	Lake O'Law.....	"
	1,121	"	Two years.....	"	"
	40	"	Four years.....	"	"
	20	"	Five years.....	"	"
	1,000	"	Fingerlings.....	Sandy Bottom lake.....	Removal of adipose and left ventral fins
	2,747	Salmon trout.....	"	Sherbrooke lake.....	"
	13,000	Atlantic salmon.....	"	Nictaux river.....	"
	24,000	"	"	Clyde river.....	Removal of adipose and right ventral fins
	20,000	"	"	Mersey river.....	"
	5,000	Speckled trout.....	"	Gardener brook.....	"
	2,000	"	"	Kejimikujik lake.....	"
	1,500	"	"	Bonaventure lake.....	"
	1,500	"	Yearlings.....	Lake Ellenwood.....	"
	900	"	"	Lake Skinner.....	"
	1,385	"	Two years.....	Gardener brook.....	"
<i>New Brunswick</i> — Florenceville hatchery..... Grand Falls hatchery (a).....	1,000	"	Three years.....	Lake Ellenwood.....	"
	622	"	"	Lake Skinner.....	"
	24,570	Atlantic salmon.....	Fingerlings.....	Nashwaak river.....	Removal of adipose and left pectoral fins
	10,000	"	"	Saint John River, at Ortonville	Removal of adipose and right pectoral fins.
	20,000	"	"	Salmon river, head-waters.....	"
	14,000	"	"	Tobique river, Millers.....	"

—	Number marked	Species	Stage of development	Liberated	Nature of mark
<i>New Brunswick</i> — Miramichi hatchery.....	5,000	Atlantic salmon.....	Fingerlings.....	Northwest Miramichi river.....	Removal of adipose and right ventral fins
	4,900	"	"	Little Southwest Miramichi river.	"
	400	Speckled trout.....	"	Buckley lake.....	"
	300	"	"	Votoure lake.....	"
	98	"	"	"	"
Saint John hatchery.....	773	Atlantic salmon.....	Yearlings.....	Kennebecasis river.....	Removal of adipose and right pectoral fins.
			Two years.....		
	2,000	Sebago salmon.....	Yearlings.....	Chamcook lake.....	Removal of adipose and right ventral fins.
	784	"	Two years.....	"	Removal of adipose and left ventral fins.
	10,000	Speckled trout.....	Fingerlings.....	Red Rock lake.....	Removal of adipose and right pectoral fins.
<i>Prince Edward Island</i> — Kelly's Pond hatchery.....	364	"	Rairdon brook, wild	Beaver lake.....	Removal of right pectoral fin.
	300	"	"	Ping Pong lake.....	"
		"	Fingerlings.....	Coles pond-North river.....	Removal of adipose and left pectoral fins.
	2,000	"	"	Webster's pond-Black river...	"
	28,000	"	"		
<i>British Columbia</i> — Cultus lake hatchery.....	15,000	Steelhead salmon...	Yearlings.....	Sweltzer creek.....	Removal of adipose fin.

(a) Restigouche stock.

RECAPTURES, 1936—ATLANTIC SALMON

MARGAREE RIVER, N.S.

Number	Weight (lbs.)	Length (ins.)	Condition	Sex	Date	1. Where liberated 2. Where caught
F6071	11	30	Kelt.....	F F	Nov. 15, 1934 July , 1936	Margaree Pond, N.S. Friar Head, Inverness county, N.S.
F6073	7 15½	27 35	Kelt..... Clean.....	F F	Nov. 15, 1934 July 15, 1936	Margaree Pond, N.S. Friar Head Point, Inverness county, N.S.
F6090	11 20	28 36½	Kelt..... Clean.....	F F	Nov. 15, 1934 July 25, 1936	Margaree Pond, N.S. One mile south of Friar Head Point, Inverness county, N.S.
F6136	15 26	35 39	Kelt..... Clean	F F	Nov. 28, 1934 July 8, 1936	Margaree Pond, N.S. La Pointe, Inverness County, N.S.
F6545	15 24	37 39.4	Kelt..... Clean.....	F F	Nov. 26, 1934 Aug. 1, 1936	Margaree Pond, N.S. Two miles northeast of Mar- garee Harbour, N.S. (down coast).
F6556	16 23	30 39½	Kelt..... Clean.....	F F	Nov. 19, 1934 Aug. 5, 1936	Margaree Pond, N.S. Malignant cove, Antigonish county, N.S.
F6559	12 (z) (u) 16	32 38	Kelt..... Kelt.....	F F	Dec. 3, 1934 Oct. 3, 1936	Margaree Pond, N.S. Mouth of Margaree river, N.S.
F6565	14 23	37 39	Kelt..... Clean.....	F F	Nov. 26, 1934 July 10, 1936	Margaree Pond, N.S. North of Friar Head Point, Inverness county, N.S.
F6578	8 15	29 35.8	Kelt..... Clean.....	F F	Dec. 5, 1934 July 25, 1936	Margaree Pond, N.S. Broad Cove Chapel, Inverness county, N.S.
F6581	14 27	37 41¾	Kelt..... Clean.....	F F	Nov. 21, 1934 Summer 1936	Margaree Pond, N.S. Mouth of Margaree river, N.S.
F6593	8 21	32 39	Kelt..... Clean.....	F F	Nov. 15, 1934 July 25, 1936	Margaree Pond, N.S. Two and one half miles west of Margaree Harbour, N.S. (down coast).
F6614	17 30	40 40½	Kelt..... Clean.....	F F	Nov. 21, 1934 June 22, 1936	Margaree Pond, N.S. Friar Head, Inverness county, N.S.
F6627	12 23	31	Kelt..... Clean.....	F F	Nov. 26, 1934 July 18, 1936	Margaree Pond, N.S. McAr. as Brook Antigonish county, N.S.
F6637	13 15½	34 34.6	Clean..... Clean.....	F F	Dec. 6, 1934 July 18, 1936	Margaree Pond, N.S. One and one half miles north- east of Margaree Harbour, N.S. (down coast).
F6654	14 24½	35 38.2	Kelt..... Clean.....	F F	Nov. 15, 1934 June 29, 1936	Margaree Pond, N.S. One and one half miles north- east of Margaree Harbour, N.S. (down coast).
F6660	12 22	36 38	Kelt..... Clean.....	F F	Nov. 15, 1934 Aug. 13, 1936	Margaree Pond, N.S. Big Island, Pictou county, N.S.
F6684	17 (z) (u) 23	37 42	Kelt..... Kelt.....	F F	Dec. 3, 1934 Oct. 11, 1936	Margaree Pond, N.S. Mouth of Margaree river, N.S.
F6730	14 27½	34 50	Kelt..... Clean.....	F F	Nov. 13, 1934 Aug. 3, 1936	Margaree Pond, N.S. Terre Noire, two and one half miles northeast of Margaree Harbour, N.S.

DEPARTMENT OF FISHERIES

RECAPTURES, 1936—ATLANTIC SALMON—*Continued*

MARGAREE RIVER, N.S.

Number	Weight (lbs.)	Length (ins.)	Condition	Sex	Date	1. Where liberated 2. Where caught
F6768	13 28½	38 40.9	Kelt..... Clean.....	F F	Nov. 15, 1934 July 20, 1936	Margaree Pond, N.S. Two miles northeast of Margaree Harbour, N.S. (down coast).
F6808	11 (z) (u) 19	31 40	Kelt..... Kelt.....	F F	Dec. 3, 1934 Sept. 22, 1936	Margaree Pond, N.S. Mouth of Margaree River, N.S.
F6864	12 24	31 37.4	Kelt..... Clean.....	F F	Nov. 15, 1934 July 18, 1936	Margaree Pond, N.S. Two miles northeast of Margaree Harbour, N.S. (down coast).
F6885	10 21	32	Kelt..... Clean.....	F F	Nov. 19, 1934 July 28, 1936	Margaree Pond, N.S. Judique South, Inverness county, N.S.
F6901	14 15	34	Kelt..... Clean.....	F F	Nov. 13, 1934 About July 17, 1936	Margaree Pond, N.S. South Manchester, Guysborough county, N.S.
F6921	14 28	35 39.3	Kelt..... Clean.....	F F	Nov. 19, 1934 Aug. 20, 1936	Margaree Pond, N.S. Terre Noire, two and one half miles northeast of Margaree Harbour, N.S.
F7129	14 10	38	Kelt..... Kelt.....	F F	Nov. 18, 1935 June 5, 1936	Margaree Pond, N.S. La Pointe, Inverness county, N.S.
F7139	7 13	30	Kelt..... Clean.....	F F	Nov. 18, 1935 July 8, 1936	Margaree Pond, N.S. St. Anthony Cape, Newfoundland.
F7179	20 15	40 41	Kelt..... Kelt.....	F F	Nov. 20, 1935 June 12, 1936	Margaree Pond, N.S. Friar Head, Inverness county, N.S.
F7191	15 26	39	Kelt..... Clean.....	F F	Nov. 20, 1935 July 30, 1936	Margaree Pond, N.S. Antigonish county, N.S.
F7201	17 15	40 40	Kelt..... Kelt.....	F F	Nov. 20, 1935 June 19, 1936	Margaree Pond, N.S. La Pointe, Inverness county, N.S.
F7310	8 12	33	Kelt..... Clean.....	F F	Nov. 26, 1935 July 4, 1936	Margaree Pond, N.S. Newfoundland.
F7373	11	36	Kelt..... Clean.....	F F	Nov. 27, 1935 July 5, 1936	Margaree Pond, N.S. Griquet, Newfoundland.
F7378	13	38	Kelt..... Kelt.....	F F	Nov. 27, 1935 May 23, 1936	Margaree Pond, N.S. Long Marsh pool, Margaree river, N.S.
F7452	17 12	39	Kelt..... Kelt.....	F F	Dec. 3, 1935 June 10, 1936	Margaree Pond, N.S. La Pointe, Inverness county, N.S.
F7478	16 14	32 38	Kelt..... Kelt.....	F F	Dec. 3, 1935 June 10, 1936	Margaree Pond, N.S. One half mile south of mouth of Little Cheticamp river, Inverness county, N.S.
F7483	6 6	28	Kelt..... Kelt.....	F F	Dec. 5, 1935 May 1, 1936	Margaree Pond, N.S. Mouth of Margaree river, N.S.
F7497	22 (z) (u) 26	41	Kelt..... Kelt.....	F F	Dec. 5, 1935 Oct. 15, 1936	Margaree Pond, N.S. Mouth of Margaree river, N.S.

RECAPTURES, 1936—ATLANTIC SALMON—*Concluded*

MARGAREE RIVER, N.S.

Number	Weight (lbs.)	Length (ins.)	Condition	Sex	Date	1. Where liberated 2. Where caught
F7502	14	39	Kelt.....	F	Dec. 5, 1935	Margaree Pond, N.S. One half mile south of mouth of Little Cheticamp river, Inverness county, N.S.
	24	41	Clean.....	F	July 25, 1936	
F7566	9	32	Kelt.....	M	Dec. 6, 1935	Margaree Pond, N.S. Mouth of Margaree river, N.S.
	.....	.....	Kelt.....	M	Jan. 10, 1936	
F7620	18	37	Kelt.....	M	Dec. 7, 1935	Margaree Pond, N.S. North of Cheticamp Island, Inverness county, N.S.
	16	.....	Clean.....	M	June 18, 1936	
F7702	18	42	Kelt.....	F	Dec. 7, 1935	Margaree Pond, N.S. Big Island, Pictou county, N.S.
	22	.....	Clean.....	F	Aug. 4, 1936	
F7742	14	37	Kelt.....	F	Dec. 7, 1935	Margaree Pond, N.S. Friar Head, Inverness county, N.S.
	.....	38	Kelt.....	F	June 12, 1936	

MORELL RIVER, P.E.I.

F1832	(x) 10½	31	Clean.....	F	Nov. 8, 1930	Morell river, P.E.I. At Englee, Newfoundland.
	Clean.....	F	June , 1932	

(u) Liberated with same tag attached.

(x) Weight estimated before stripped.

(z) Weight after stripped.

NOVA SCOTIA
ANTIGONISH HATCHERY

—	Atlantic Salmon			Rainbow Trout Fingerlings No. 3	Speckled Trout				Old fish
	Advanced fry	Fingerlings			Fingerlings				
		No. 1	No. 2		No. 1	No. 2	No. 3	No. 4	
Antigonish Co.—									
Beaver Meadow river.....					50,000				
Beech Hill lake.....					10,000			300	
Brierly brook.....					10,000				500
Copper lake.....					25,000			15,000	500
Glenroy river.....									
James river.....	75,000	70,000			15,000				
James river lake.....						10,000			
Maryvale brook.....					40,000				
Meadow Green river.....					20,000				500
North lake.....					10,000				
Pinevale lake.....					15,000				
Polson brook-South river.....									
Right river.....		50,000			15,000				
South lake.....		150,000			20,000				260
South river.....									
South river lake.....							4,000		1,000
Springfield brook-Pomquet river.....									
Tracadie river.....		100,000			40,000			15,000	1,000
West river.....									
Colchester Co.—									
Irving lake.....							3,000		
Rocky lake.....							3,000		
Cumberland Co.—									
River Philip.....		100,000							
Guysboro Co.—									
Archibald lake.....							5,000		
Cooper lake.....					10,000				
Cooee Coffre lake.....								8,000	
Country Harbour river.....		150,000							
Cutler lake.....								8,000	
Donahue lake.....					40,000				
Ecum Secum river.....					20,000				
Eight Island lake.....					10,000				
Forbes Wall lake.....								2,000	
Golbobo lake.....									
Hazel Hill lake.....							10,000		
Indian Harbour lake.....					20,341				
					10,000				

BEDFORD HATCHERY

	Atlantic Salmon				Speckled Trout Fingerlings	
	Eyed eggs	Advanced fry	Fingerlings		No. 1	No. 2
			No. 1	No. 2		
Dalhousie University, Halifax.....	8,000					
Colchester Co.—						
Economy river.....				30,720		
Salmon river.....		75,000				
Stewiacke river.....			75,000			
Stewiacke river, south branch.....			30,000		30,000	
Cumberland Co.—						
Isaac lake.....					35,000	
Maccan river.....			30,000			
River Philip.....			200,000			
Shinimikas river.....			30,000			
Halifax Co.—						
Barrett lake.....					6,000	
Big salmon river.....		75,000	30,000			
Brown lake.....					32,000	
Chezzetcook river.....			75,000			
Five Island lake.....					30,000	
Fraser lake.....					20,000	
Halfway river.....					30,000	
Heffler lake.....					35,000	
Higgins brook.....			30,000			
Ingram river.....			115,000			
Jack lake.....						2,000
Kearney lake.....					35,000	
Kehoe or Second lake.....					45,000	
Little lake or Davison pond.....						2,000
Little Quoddy lake.....					30,000	
Mary lake.....					35,000	
Maxwell lake.....					30,000	1,665
Moosehorn lake.....					30,000	
Nine Mile river.....			105,000			
Northwest or west brook-Salmon river.....			50,000			
Oisier river.....			30,000			
Pentz lake.....					30,000	
Pine Island lake.....					30,000	
Porter lake.....			30,000			
Preeper lake.....						4,000
Sackville river.....			145,000	37,465		
Salmon river (Port Dufferin).....			56,860			
East River Sheet Harbour.....					30,000	
West River Sheet Harbour.....			50,000	40,000		
Ship Harbour lake.....		50,000				
Stillwater lake—St. Margaret bay.....					32,000	
Taylor brook.....			75,000			
Tucker lake.....					30,000	
Hants Co.—						
Five Mile lake.....					50,900	
McLellan or Valley lake.....					30,000	
Lunenburg Co.—						
Corkum lake.....					30,000	
Gold river.....		75,000	125,000			
Lily lake.....					30,000	
Middle river.....			125,000			
Mill lake.....					35,000	
Spectacle lake.....					30,000	
	8,000	275,000	1,406,860	108,185	780,900	9,665

Total distribution..... 2,588,610

GRAND LAKE REARING PONDS

	Atlantic Salmon Fingerlings			Landlocked Salmon	
	No. 2	No. 3	No. 5	Yearlings	Two years
Cumberland Co.—					
River Philip.....	140,000				
Halifax Co.—					
Grand lake.....				16,700	135
Lake Major.....			4,000		
Nine Mile river.....	40,000		4,000		
Sackville river.....			13,200		
Salmon river (Port Dufferin).....	40,000				
Ship Harbour lake.....		20,000			
Springfield lake.....				1,500	
Third lake.....			12,000	1,000	
Musquodoboit river.....	65,000				
	285,000	20,000	33,200	19,200	135

Total distribution..... 357,535

LINDLOFF SUB-HATCHERY

	Atlantic Salmon Fingerlings			Speckled Trout Fingerlings
	No. 1	No. 2	No. 3	No. 3
Cape Breton Co.—				
Gaspereau river.....		50,000		
Salmon river.....	40,000	55,000	173,000	
Richmond Co.—				
Ferguson lake.....				6,500
Grand river.....	180,000	55,000	40,000	
McIsaac lake.....				8,128
McKay brook-Grand river.....			20,000	
Murchison brook-Grand river.....	30,000			
Shaw lake.....				6,500
Tillard river, west.....				6,500
	250,000	160,000	233,000	27,628

Total distribution..... 670,628

DEPARTMENT OF FISHERIES

MARGAREE HATCHERY

[illegible]

DEPARTMENT OF FISHERIES

MIDDLETON HATCHERY

	Atlantic Salmon Fingerlings			Salmon Trout Fingerlings		Speckled Trout Fingerlings				Year- lings
	No. 1	No. 2	No. 3	No. 1	No. 3	No. 1	No. 2	No. 3	No. 4	
Annapolis Co.—										
Annapolis river.....	140,000					4,000				
Blanchard lake.....						4,000				
Butler brook-Shannon lake.....							4,000			
Chute lake.....						4,000				
Cranberry lake.....						5,000				
Elliott lake.....						4,000				
Foster lake.....						4,000				
Gesner lake.....									500	
Hatchery pond.....								6,000		
Lake Jolly.....										
Lequille river.....	25,000					5,000			400	12
Lily lake.....							4,000			
Little river.....						6,000				
Little lake-Lequille river.....						4,000				
Long lake-North Mountain.....										
Long lake-Bear river (east branch).....							5,000			
Long lake-Medway river.....						4,000		7,000		
Millbury lake.....							4,000			
Mitchell lake.....								56,000		
Nictaux river.....	60,000	175,000	364,144							
Round Hill river.....	25,000						4,000			
Rumsey lake.....								6,000		
Sandy Bottom lake.....						5,000				
Shannon river.....						4,000				
Stronach lake.....						6,000				
Trout lake.....								6,000		
Waterloo lake.....						4,000				
Worster lake.....						6,000				
Wright lakes.....						4,000				
Young lake.....										
Cumberland Co.—								6,000		
Cranberry lake.....										
Digby Co.—										
Eight and Ninth lakes.....									5,000	
Sissiboo river.....								7,000		
Harris lake.....							4,000			
Mallett lake.....							8,000			
Porter or Mistake lake.....								5,000		
Syda lake.....										
Hants Co.—								8,000		
Canoe lake, north.....								6,000		
Falls lake.....							5,000			
Murphy lake.....								6,000		
Nixes lake.....								7,000		
Palmer river.....		25,000								
River Herbert.....										
Kings Co.—										
Aylesford rearing ponds (Kings County Fish, Forest and Game Protective Association.....								1,000		
Burke lake.....						4,000				
Canning reservoir.....								200		
Habitant river.....						5,000				
Hardwood lake.....								6,000		
Lake George.....						6,000				
Lake Torment.....						6,000				
Mack lake.....						4,000				
Lunenburg Co.—						5,000				
Butler lake.....								7,000		
Cross or Sperry lake.....										
Gold river.....	40,000	100,000								
LaHave river.....	135,000	40,000								
Middle river.....	40,000	50,000								
Petite river.....	50,000									
Sherbrooke lake.....				68,725	2,747					
Whetstone lake.....							5,000			
Whitney lake.....							7,000			
Queens Co.—										
Medway river.....	110,00	50,000								
	625,000	440,000	364,144	68,725	2,747	103,000	57,000	133,200	5,900	12

Total distribution..... 1,799,728

NICTAUX FALLS REARING STATION

	Atlantic Salmon Fingerlings		
	No. 1	No. 3	No. 4
Annapolis Co.—			
Nictaux river.....	30,000	15,000	14,390
Total distribution.....			59,390

Fry	Atlantic Salmon				Kamloops Trout	Rainbow Trout			Speckled Trout			Two years	Three years			
	Ad- vanced fry	Fingerlings			Finger- lings No. 5	Finger- lings No. 5	Year- lings	Two years	Four years	Five years	Ad- vanced fry			Fingerlings		
		No. 1	No. 2	No. 3										No. 4	No. 5	No. 1	No. 4	No. 5
Department of Highways, Nova Scotia																
Indian lake and tributaries, Snake Creek district, Quebec																
Annapolis Co.—					2,600											
Bear river	60,000	20,000			10,000											
Lequille river																
Digby Co.—																
Barrio lake																
Bear lake																
Belliveau Cove river																
Bonaventure lake																
Clear lake																
Grosses Coques river																
Heenanoga lake																
Meadow brook-Carleton river																
Meteghan river																
Payson's Meadow																
Riviere a Margo-Meteghan river																
Salmon river	50,000	55,000	90,000		30,000											
Silver river																
Victor lake																
Wentworth lake																
Kings Co.—																
Hardwood lake																
Sunken lake																
Lunenburg Co.—																
Willes lake																
Queens Co.—																
Deep lake																
Hardy lake																
Kejimikuk lake																
Medway river	120,000	35,000	45,000	18,000												
Mersey river	60,000	80,000	100,000	8,000	7,000	5,000										
Shelburne Co.—																
Barrington river																
Big brook																
Clyde river	135,000	50,000	55,000	34,000												
East river																
Green Harbour brook																
Ogden brook																
Roseway river	60,000		20,000	20,000												
Yarmouth Co.—																
Carleton river																
East branch brook-Tusket river																
Gardener brook																
Killam brook	100,000															
Lake Ellenwood																
Lake Jesse																
Lake Skinner																
Lake Utley																
Meadow brook																
Salmon river		75,000	30,000	60,000												
Simon lake																
100,000	375,000	350,000	325,000	240,000	9,600	35,000		15,050	10,619	20	8	340,000	168,000	2,000	9,050	3,937
								6,500								650
																2,407
																830

NEW BRUNSWICK
FLORENCEVILLE HATCHERY

	Atlantic Salmon				Speckled Trout					
	Ad- vanced fry	Fingerlings			Year- lings	Two years	Three years	Four years	Five years	Six years
		No. 1	No. 2	No. 3						
Boston Sports-men's Show Fredericton Exhibition. Carleton Co.—				500	6	20	2	30	2	2
Becaguinec river.....	75,000	200,000		10,000						
Big Guisguilt river.....										
Little Guisguilt river.....	75,000	75,000								
Big Presquile river.....	70,000									
Big Shiktahawk river.....		40,000		7,000						
Little Shiktahawk river.....	50,000			5,264						
Birmingham brook—Becaguinec river.....		16,000								
Bogan brook—Southwest Miramichi river.....										
Bubby brook—Saint John river.....										
Bull creek—Saint John river.....										
Burntland brook—Becaguinec river.....										
Burpee brook—Presquile river.....										
Clearwater brook—Southwest Miramichi river.....		20,000								
Colton brook—Shiktahawk river.....										
Day brook—Becaguinec river.....										
Elliot brook—Southwest Miramichi river.....		32,000								
Gallivan brook—Saint John river.....										
Gin brook—Becaguinec river.....										
Hagerman brook—Saint John river.....										
Hardwood brook—Saint John river.....										
Second Howard brook—Becaguinec river.....										
Lanes creek—Saint John river.....										
McLeary brook—Lakeville pond.....										
McQuade pond—Saint John river.....										
Maynes brook—Little Presquile river.....										
McDuxnekeag river.....	75,000	170,000	30,000	14,000						
Southwest Miramichi river, North branch.....	75,000	135,000	60,000	6,000						
Southwest Miramichi river, South branch.....	75,000	135,000	60,000	6,000						
Monquart river.....		70,000								
River de Clute.....										
Simpson brook—Southwest Miramichi river.....		16,000								

GRAND FALLS HATCHERY

	Atlantic Salmon Fingerlings			Speckled Trout			
	No. 1	No. 2	No. 3	Ad- vanced fry	Fingerlings		
					No. 1	No. 2	No. 3
Round lake, Quebec.....							10,000
Salmon river—Victoria Co.—							
Salmon river, at Estey camp.....	40,000	20,000					
Salmon river, at Guimont lodge.....	35,000						
Salmon river, at Mignault lodge.....	20,000						
Salmon river, at Power's camp.....	50,000						
Salmon river, mouth of.....	10,000	20,000					
Salmon river, headwaters.....		50,000	105,000				
Salmon river flats.....	95,000						
Aubin crossing.....	15,000						
Big bogan.....	40,000						
Boat landing.....	20,000	40,000					
Cote Mill.....	75,000	20,000					
Covered bridge.....	40,000						
Cyr flats.....	35,000	40,000					
Danish Mill.....	15,000						
Davis Mill.....	35,000						
Iron bridge.....	35,000						
Little Salmon river.....	90,000	40,000					
Sutherland brook.....						50,000	
St. John river—Victoria Co.—							
Andover.....	65,000						
Andover bar.....		40,000					
Andover, upper.....	25,000						
Aroostock.....		40,000					
Aroostock junction.....	20,000						
Private pond, Boutout brook, Mr. W. J. St. Thomas.....				5,000			
Cliffordvale.....	35,000						
Coronation.....	35,000						
Falls brook.....					5,000		
Fraser's dead water, Three brooks.....					20,000		
Hatchery brook, above falls.....					5,000		
Indian ferry.....	25,000						
Inman flats.....	100,000	40,000					
Kilburn.....		40,000					
Kilburn ferry.....	100,000	40,000					
Limestone.....	20,000						
Morill.....	55,000	20,000					
Mulherin lake.....							4,000
Muniac river, mouth of.....	25,000	40,000					
Ortonville.....	20,000						
Perth.....	80,000	40,000					
Perth, lower.....	40,000	40,000					
Perth, upper.....		40,000					
Pokiok brook.....					75,000		
Price brook.....							5,000
Sullivan flats.....	25,000						
Tobique river, mouth of.....	25,000	40,000					
Beaver brook.....						50,000	
Blue mountain bend.....			44,000				
Fraser lodge.....			40,000				
Haley brook.....	50,000						
Millers.....			40,000				
Millers bogan.....			30,000				
Two brooks.....			80,000				
Waters bogan.....			40,000				
Waters bogan to Millers.....			40,000				
Undine.....	10,000						
Madawaska Co.—							
Baker lake.....							100,000
Baker brook.....							35,000
Black brook.....					50,000		
Green river.....					75,000		205,000
Iroquois river.....							135,000
Little river.....					110,000		
Dead brook.....					25,000		
Michaud rocks.....						25,000	
Mud lake.....					65,000		
Perkin brook.....					15,000		
Power creek-Nine Mile brook.....							14,616
Private pond, Power creek, Mr. Zeno Martin				5,000			
Quisibis river.....							30,000
Trout brook.....							120,000
Unique lake.....							30,000
	1,405,000	650,000	419,000	10,000	445,000	125,000	688,616

Total distribution..... 3,742,616

MIRAMICHI HATCHERY

	Atlantic Salmon				Speckled Trout	
	Eyed eggs	Advanced fry	Fingerlings		Finger- lings No. 2	Year- lings
			No. 1	No. 2		
Biological Board, Toronto.....	1,000					
Buckley lake.....					945	
Little Southwest Miramichi river.....			647,200	251,570		
Middle river.....				38,400		
Northwest Miramichi river.....		413,000	728,400	16,000		
Millstream brook.....		112,000	30,000			
Sevogle river.....				248,000		
Stewart brook.....			35,200			
Trout brook.....		38,500				
Southwest Miramichi river.....			90,800	87,200		
Barnaby river.....		112,000		19,200		
Cain river.....		112,000	161,200			
Renous river.....		112,000	144,000			
Dungarvon river.....		112,000	35,200			
Taxis river.....			96,000			
Tabusintac river.....		56,000	35,200	35,200		
Tetagouche river.....				56,000		
Votoure lake.....					800	98
	1,000	1,067,500	2,003,200	751,570	1,745	98
Total distribution.....					3,825,113	

RESTIGOUCHE HATCHERY

	Atlantic Salmon			Speckled Trout	
	Fry	Fingerlings		Ad- vanced fry	Finger- lings No. 1
		No. 1	No. 2		
Benjamin river.....					4,063
Black river.....					25,000
Charlo river.....					25,000
Lily lake.....				5,000	
Shipyard lake.....					25,000
Christopher river.....					10,000
Jacquet river.....		50,000			
Middle river.....	50,000				
Nipisiguit river.....	393,453				
Restigouche river.....		505,000	213,673		
Little Main river.....		91,547			
Matapedia river.....		735,000			
Upsalquitch river.....		594,159			
Walker brook.....					10,000
	443,453	1,975,706	213,673	5,000	99,063
Total distribution.....					2,736,895

HATCHERY

[illegible]

No.		Atlantic Salmon					Brown Trout Hybrids			Landlocked Salmon	
		Green eggs	Fry	Advanced fry	Finger-lings No. 1	Two years	Finger-lings No. 4	Year-lings	Two years	Year-lings	Two years
58	Moss Glen lake.....										
59	Price brook-Canaan river.....										
60	Puddington lake.....										
61	School brook-Kennebecasis river.....										
62	Smith creek-Kennebecasis river.....										
63	Trout creek-Kennebecasis river.....			100,000							
64	Wetmore dam-Kennebecasis river.....										
65	Wolf lake.....										
66	Queens Co.—										
67	Canaan river.....										
68	Canaan river, forks.....										
69	Deer lake.....										
70	Lake stream-Salmon river.....										
71	Salmon river.....			75,000	75,000						
72	Tilly lake.....										
73	St. John Co.—										
74	Beaver lake.....										
75	Black river.....			150,000							
76	Boaz lake.....										
77	Burley lake.....										
78	Cook lake.....										
79	Donaldson lake.....										
80	Douglas lake.....										
81	Germain brook-Hammond river.....										
82	Glendarag lake.....										
83	Grassy lake.....										
84	Hanford brook.....										
85	Henry lake.....										
86	Lily lake-Rockwood park.....						1,021	3,764	3,261		
87	Little river.....										
88	Loch Alva-Saint John and Kings Cos.....										
89	Loch Lomond.....										
90	Stephenson's brook pond-Loch Lomond.....										
91	McDonald lake.....										
92	Menzie lake.....										
93	Milligan lake.....										
94	Mispek river.....										
95	Ping Pong lake.....										
96	Southern lake.....										
97	Taylor lake.....			100,000							
98	Tyne Mouth creek.....										
99	Wilnot brook-Loch Lomond.....										
100	Sunbury Co.—										
101	Oromocto river.....			100,000	100,000						
102	Otter brook.....										
103	Peltona lake.....										
104	Shin creek.....										
105	Three Tree creek.....										
106	Westmorland Co.—										
107	Anagance river.....										
108	Bennett brook-Petitcodiac river.....										
109	Petitcodiac river.....			200,000							
110	Shediac river.....										
111	York Co.—										
112	Baker brook pond.....										
113	Big Oromocto lake.....										
114	Clear lake.....										
115	Cranberry brook.....										
116	Grant lake.....										
117	Harvey lake.....										
118	Jamieson lake.....										
119	Lake George.....										
120	Lyon stream, west branch.....										
121	Magundy stream.....										
122	Little McAdam stream.....										
123	Mink lake.....										
124	Musquash brook-Spendic lake.....										
	Risteen lake.....										
	Stony brook.....										
	Tom Davis lake.....										
	Trout brook, upper.....										
	Trout brook, lower.....										
		6,000	100,000	975,000	502,574	823	1,021	3,764	3,261	2,000	784

Total distribution.....

*Operated by Saint John branch of the New Brunswick Fish and Game Protective Association in conjunction with

HATCHERY—Concluded

Loch Leven Trout			Speckled Trout											No.
Finger- lings No. 4	Year- lings	Two years	Ad- vanced fry	Fingerlings				Year- lings	Two years	Three years	Four years	Five years	Wild fish	
				No. 1	No. 2	No. 3	No. 4							
			15,000											58
				5,000										59
				2,500										60
				5,000										61
					2,000									62
														63
			5,000											64
				5,000										65
				5,000										66
					5,000									67
			5,000											68
					5,000									69
					3,000									70
														71
													364	72
				2,000										73
				3,000										74
			3,000											75
			5,000											76
			5,000											77
			5,000											78
				15,000										79
			500											80
				5,000										81
				15,000										82
				10,000										83
				5,000										84
158	657	62		5,000				760			2			85
					2,000									86
								1,116	36	45		13		87
				5,000										88
			10,000											89
					3,000									90
				10,000										91
				15,000										92
				5,000										93
				10,000									300	94
														95
														96
					10,000		1,500							97
														98
				10,000										99
				5,000										100
				10,000										101
				10,000										102
				5,000										103
				10,000										104
			30,000											105
														106
				5,000										107
					5,000									108
				5,000										109
				5,000										110
				5,000										111
				25,000										112
				5,000										113
					5,000									114
					5,000									115
					5,000									116
				5,000										117
				5,000										118
														119
				5,000										120
				5,000										121
				5,000										122
				5,000										123
				5,000										124
158	657	62	163,500	569,200	70,000	1,256	1,500	1,876	36	45	2	13	664	

DEPARTMENT OF FISHERIES

PRINCE EDWARD ISLAND
KELLY'S POND HATCHERY

	Atlantic Salmon			Speckled Trout Fingerlings	
	Fry	Advanced fry	Fingerlings No. 1	No. 1	No. 2
Kings Co.—					
Black pond.....				3,000	
Cardigan river.....		40,000	20,085		
Coogan brook-Morell river.....	40,000		50,000		
Dingwell brook-Fortune river.....				6,000	
Fortune river.....			40,000		
Fisher brook-Morell river.....				6,000	
Goose river.....				5,000	
Hay river.....				5,000	
Leard's, below mill-Morell river.....			50,000		
McCasil river.....			25,000		
McKinnon brook-Morell river.....			25,000		
East branch.....	40,000				
West branch.....	40,000				
McNeill brook-Morell river.....			25,000		
McRae's pond-Montague river.....			50,000	5,000	
Midgell river.....				5,000	
Montague pond.....					
Montague river.....		60,000	25,000		
Mooney stream-Morell river.....	40,000		30,000		
Morell river.....		224,000	45,000		
Naufrage river.....		48,000	45,000		
North lake.....			25,000		
Pool's pond-Brudenell river.....					3,000
Quigley's stream, below mill-St. Peters bay.....			50,000		7,200
Quigley's pond.....					
Head of St. Peters bay.....			50,000		
Schooner pond.....		48,000			
South lake.....				3,000	
Surgeon river.....			25,000		
Warren's, below mill-Head of East river.....			50,000		
Whelan brook-Souris river.....				5,000	
Prince Co.—					
Conroy's pond.....					6,500
Leard's pond-Trout river tributary to Lot 10 river.....				5,000	
Little Pierre Jacques river.....				5,000	
McArthur's pond-Foxley river.....				14,400	
McKay's pond.....					3,720
Myrick's pond-Tignish river.....				5,000	
Rix stream-Huntley river.....				5,000	
Round pond.....				5,000	
Sheep river.....					4,340
Tignish river.....				5,000	
Tyne Valley stream-Trout river.....					3,000
Tuplin's pond-Indian river.....					3,000
Queens Co.—					
Bell river.....				5,000	
Campbell's pond-New Glasgow.....					3,000
Coles pond-North river.....					2,748
Crooked creek.....				5,000	
Gurney's stream.....					5,500
Hope river.....				5,000	
McPherson's pond-Flat river.....				5,000	
McPherson's pond-Pinette river.....				5,000	
Pleasant Grove-Winter river.....				5,000	
Rackham's pond-Wheatley river.....				4,000	
Sherry brook-East river.....					3,000
Webster's pond-Black river.....					28,000
Winter river.....	20,000				
Wisner's pond-Fanning brook.....				8,000	
	180,000	420,000	630,085	129,400	73,008

Total distribution..... 1,432,493

DEPARTMENT OF FISHERIES

JASPER PARK SUB-HATCHERY

	Rainbow trout advanced fry
Adolphus lake.....	2,000
Beaverdam creek-McLeod river.....	10,000
Brazeau lake.....	20,000
Bryan creek-Embarras river.....	5,000
Center creek-Pembina river.....	10,000
Cracked creek-Pembina river.....	5,000
Dummy creek-Embarras river.....	5,000
Edson river, north fork.....	20,000
Erith river.....	10,000
Fryatt lake.....	4,318
Geraldine lake.....	4,000
Gregg river.....	5,000
Hornbeck creek-Sundance river.....	7,385
Horseshoe lake, upper.....	1,500
Lake Annette.....	65,000
Lake Edith.....	65,000
Leach lake.....	6,000
Little Pembina river.....	5,000
Little Trefoil lake.....	2,000
Mary Gregg lake.....	10,000
McKenzie creek-McLeod river.....	10,000
Mercoal creek-McLeod river.....	5,000
Mina lake.....	4,000
One Mile creek-McLeod river.....	5,000
Patricia lake.....	110,000
Prairie creek-Athabasca river.....	1,000
Press creek-Embarras river.....	5,000
Prospect creek-White Horse creek.....	10,000
Pyramid lake.....	140,000
Sucker creek-McLeod river.....	4,000
Sulphur creek-McLeod river.....	5,000
Thornton creek-McLeod river.....	5,000
Trout creek and tributaries.....	20,000
Lake Pali-ade.....	1,500
Valley of the Five lakes—	
Lake No. 1.....	1,000
Lake No. 3.....	500
Lake No. 4.....	500
Lake No. 5.....	1,000
White Horse creek-McLeod river.....	10,000

603,703

Total distribution... 603,703

WATERTON LAKES HATCHERY

	Cutthroat Trout				Rainbow Trout				
	Eyed eggs	Ad- vanced fry	Fingerlings		Five years	Ad- vanced fry	Finger- lings No. 1	Three years	Five years
			No. 1	No. 5					
Belly river.....		30,000							
Barns creek—									
Beaver dams (7-1-28, W. 4).....		10,000							
Indian creek.....		5,000							
North fork.....		5,000					22,575		
Castle river.....									
Beaver Mines creek.....						30,000			
Carbondale river.....						25,000			
Gardener creek.....						6,000			
Gladstone creek.....						15,000			
Gravenstafle creek.....						10,000			
Link or Lynx creek.....						6,950			
Lost creek.....							3,000		
Mill creek.....						25,000			
Spruce creek.....						5,000			
Webb creek.....						10,000			
West branch.....						20,000			
Beaver dams (10, 17-5-3, W. 5).....						30,000			
Crowsnest lake.....						40,000			
Crowsnest river—									
Allison creek.....						25,000			
Blairmore creek.....						25,000			
Byron creek.....						10,000			
Gold creek.....							35,000		
Rock creek.....									
Star creek.....						10,000			
Livingsstone river.....		35,000				10,000			
Coat creek.....		5,000							
Twin creek.....		5,000							
Oldman river—									
Daisy creek.....		12,900							
Ernst creek.....		10,000							
Gap Beaver dams (32-10-3, W. 5).....		50,000							
Pincher creek.....						40,000			
Racehorse creek.....									
Willow creek—		50,000							
Corral creek.....						5,000			
East Nelson creek.....						5,000			
Iron creek.....						5,000			
Johnston creek.....						5,000			

WATERTON LAKES HATCHERY (continued)

Name of stream	Cutthroat Trout			Rainbow Trout			
	Ad- vanced fry	Fingerlings		Ad- vanced fry	Finger- lings No. 1	Three years	Five years
		No. 1	No. 5				
Lyndon creek.....				45,000			
Nelson creek.....				10,000			
North fork.....				20,000			
Riley creek.....				5,000			
Trout creek.....				10,700			
Westrip creek.....				15,000			
Waterton lake (lower).....	10,000						
Waterton lake (upper).....	90,300	25,000					
Waterton river—							
Alderson lake.....		3,000					
Baerman brook.....		5,000					
Beaver dams (5-1-2, W. 5).....		5,000					
Beaver dams (31-1-29, W. 4).....		5,000					
Bertha lake.....		3,000					
Butcher creek.....				15,000			
Cameron creek.....	10,000						
Cameron lake.....	22,000	20,000		15,000			
Carpenter creek.....		6,000		20,000			
Carthow lake.....							
Cottonwood creek.....							
Crooked creek.....		5,810					
Beaver dams (23-1-29, W. 4).....	10,000						
Crypt lake.....	3,600						
Drywood creek—							
Beaver dams (9-1-1, W. 5).....		6,000	16,202		13,850	30	40
Forum lake.....							
Hatchery or Spring creek.....				10,000			
Lineham creek.....							
Linnet lake.....		1,000					
Lone lake.....		5,000					
Lest lake.....		6,000					
Mack lake.....							
Pass creek.....	6,000	39,000					
Pine creek.....				10,000			
Rowe creek.....		10,000					
Rowe lake.....							
Summit lake.....	9,200						
Yarrow creek.....	3,000						
Beaver dams (33-3-29, W. 4).....				30,000			
	24,800	135,500	16,202	35	74,425	30	40
	391,900			568,650			

Total distribution.....

1,208,582

BRITISH COLUMBIA
ANDERSON LAKE HATCHERY

	Sockeye salmon fry
Anderson lake—	
Adlem creek	576,000
Boulder creek	576,000
Cabin creek	576,000
Cedar creek	288,000
Clemens creek	960,000
Eight Mile beach	864,000
Falls creek	288,000
Granite creek	576,000
Refuge bay	288,000
Ternan creek	98,972
	<hr/>
Total distribution	5,090,972
	5,090,972

ARGENTA SUB-HATCHERY

	Kamloops trout fry
Kootenay lake—	
Argenta slough	200,000
Big slough	50,000
East shore	37,260
Fry creek bay	50,000
Lardeau bay	50,000
Schroeder bay	50,000
	<hr/>
Total distribution	437,260
	437,260

BABINE LAKE HATCHERY

	Sockeye salmon fry
Morrison creek	2,649,736
Morrison lake	3,500,000
	<hr/>
Total distribution	6,149,736
	6,149,736

BEAVER LAKE EYEING STATION

	Kamloops Trout	
	Eyed eggs	Fry
Alex. Mountain lake-Island lake.....		2,500
Beaver lake.....		18,060
Crooked creek.....	60,000	
Crooked lake.....		90,000
Dee lake.....	100,470	
Deer lake.....		75,000
Dorine lake-Dee lake.....		10,000
Echo creek.....	132,968	
Echo lake.....		2,000
Island lake.....		84,500
Kelowna rearing ponds, Kelowna Rod and Gun Club.....	150,000	185,760
Lost lake-Deer lake.....		2,500
Rod lake-Crooked lake.....		3,500
Round lake.....		1,000
Wilma lake-Dee lake.....		2,500
	<hr/>	<hr/>
	443,438	477,320

Total distribution..... 920,758

DEPARTMENT OF FISHERIES

CULTUS LAKE HATCHERY

	Coho Salmon Fry	Cutthroat Trout Advanced Fry	Kamloops Trout Fry	Sockeye Salmon Fry	Steelhead Salmon	
					Eyed eggs	Finger- lings No. 1
Stanley Park hatchery.....					25,000	
Echo lake.....			20,000			
Elbo lake.....			5,000			
Marshall creek-Sumas river.....		18,443				
McConnel creek-Stave lake.....			24,460			
Sweltzer creek.....	393,600			42,435		103,052
Wolf lake.....			20,000			
	393,600	18,443	69,460	42,435	25,000	103,052

Total distribution..... 651,990

KENNEDY LAKE HATCHERY

	Sockeye Salmon		
	Eyed eggs	Advanced fry	Finger- lings No. 1
Kennedy lake—			
Clayoquot Arm—			
Elbow lake.....	44,730		
Elbow bay-Deer bay.....		250,000	
Fir creek-Silent bay.....		200,000	
Irvin creek.....	89,465		
Irvin creek-Rocky bay.....		150,000	
Log bay-Silent bay.....			189,571
Log bay-Yew creek.....			124,480
Martin creek-Peter creek.....		200,000	
Narrows vicinity.....		200,000	
Pond beach.....		150,000	468,312
Pond creek.....			75,000
Rocky bay-Cosy bay.....		243,360	
Silent bay-Narrows.....		463,565	
Silent bay vicinity.....		194,600	
Alberni bay.....		200,000	
Charlie creek-Swan bay.....		200,000	
Charlie creek-Ucluelet bay.....		443,470	
Draw creek.....	350,385		
Grant creek and north.....		200,000	
Grant creek and south.....			243,245
Halfway point-High point.....		250,000	220,000
Narrows-Halfway point.....		220,000	
Sand river vicinity.....			146,650
Shallow bay-Nerger bay.....		243,275	
Snag bay.....		243,255	250,000
Trail beach-Snag bay.....			175,000
Ucluelet bay.....		450,000	250,000
Kennedy river.....			71,854
Olsen slough.....			194,557
Sutton's slough.....		200,000	
Swan bay.....		250,000	
Muriel lake—			
David creek.....	969,145		
	1,453,725	4,951,525	2,408,669

Total distribution..... 8,813,919

LLOYD'S CREEK SUB-HATCHERY

	Kamloops Trout	
	Eyed eggs	Fry
Hope district—		
Coquihalla river.....	35,000	.....
Crown lake.....	20,000	.....
Kelly lake.....	30,000	.....
Pavilion lake.....	50,000	.....
Scham or Haig lake.....	5,000	.....
Silver lake.....	25,000	.....
Kamloops district—		
Pool, Indian Reserve at Kamloops.....		1,640
Andy lake.....		5,000
Beaver lake, near Black pool.....	15,000	.....
Beaver lake, near Devick's.....		2,000
Bell lake.....		5,000
Black Pines lake.....		2,000
Bridge lake.....		5,000
Brigade or Philip's lake, Kamloops, (Alex. Philip, Esq.).....		1,000
Devick lake.....		3,000
Fish lake.....		250,000
King lake.....		5,000
Knouff lake.....		150,000
Latremouille lake, near Mt. Olie.....	20,000	.....
McConnell lake.....		5,000
Paul lake.....		200,000
Peterhope lake.....		10,095
Pillar lake.....		20,000
Pinantan lake.....		150,000
Red lake.....		20,000
Rhoda lake.....		5,000
Silent lake.....		5,000
Link lake, near Ocean Falls.....	100,000	.....
Prudhomme lake, near Prince Rupert.....	100,000	.....
Prince George district—		
Cluculz lake.....	30,000	.....
Kathlyn lake.....	50,000	.....
Lascelle lake.....	10,000	.....
Moose lake.....	20,000	.....
Ness lake.....	10,000	.....
Small lake.....	10,000	.....
Yellowhead lake.....	20,000	.....
Qualicum ponds (Provincial).....	194,000	.....
Revelstoke Rod and Gun Club, Biological Station, Taft, B.C.....	120,000	.....
Shuswap district—		
Johnstor's pool, near Eagle bay, (A. T. Johnston, Esq.).....		1,000
Bear creek-Adams river.....	80,000	.....
Canoe creek-Shuswap lake.....	50,000	.....
Gardners lake, Salmon Arm (Gardners lake Fishing Club).....		2,000
Granite creek-Shuswap lake.....	50,000	.....
Loon lake.....		5,000
McGuire lake.....		2,000
Palmer creek-Salmon river.....	50,000	.....
Reneickers creek-Shuswap lake.....	50,000	.....
Salmon river.....	35,000	.....
Scotch creek-Shuswap lake.....	95,000	.....
Shuswap lake.....		10,000
White lake.....		25,000
Wright lake.....		8,000
Vancouver district—		
Cannall lake.....	30,000	.....
Hayward lake.....	15,000	.....
Powell lake.....	150,000	.....
The Highlands.....	1,000	.....
Vancouver island—		
Cameron lake.....	70,000	.....
Lower Campbell lake.....	50,000	.....
Cowichan lake.....	60,000	.....
Great Central lake.....	90,000	.....
Shawnigan lake.....	50,000	.....
Sproat lake.....	81,000	.....
Veitch creek retaining ponds (Provincial).....	58,000	.....
	1,929,000	897,735

Total distribution..... 2,826,735

DEPARTMENT OF FISHERIES

MURTLE LAKE CAMP

	Kamloops
	trout eyed eggs
Blue river, above falls	25,721
Lake Eleanor	18,099
	43,820
Total distribution	43,820

NELSON HATCHERY

	Kamloops Trout		Kennerly's Salmon		Speckled Trout	
	Eyed eggs	Fry	Eyed eggs	Fry	Eyed eggs	Fry
Creston district—						
Corn creek.....					30,000	
Meadow creek-Goat river.....					30,000	
Grand Forks district—						
Christina lake.....	40,000					
Sander creek.....			150,000			
Smelter lake.....		35,000				
Greenwood district—						
Collier lake.....	15,000					
Conkle lake.....	25,000					
Jewel lake.....		20,000				
Kettle river.....	30,000					
State creek lake.....		5,000				
Wildgress or Loon lake.....		10,000				
West Kootenay—						
Arkansaw lake.....		12,000				
Arrow lake, lower (at Syringa).....		30,000				
Arrow lake, lower (at Edgewood).....	35,000					
Arrow lake, upper.....	40,000					
Barratt lake.....	10,000					
Bayonne lake.....	10,000					
Bear lake.....	13,000					
Beatrice lake.....	20,000					
Beaver creek.....						20,000
Big Sheep creek.....						30,000
Bonanza creek-Slocan lake.....			75,000			
Boundary lake.....						20,000
Box lake.....		15,000				
Cahill lake.....	35,000					
Crawford bay.....		12,000				
Crawford bay retaining pond (Capt. Hincks).....		1,000				
Erie lake.....						20,000
Fletcher lake.....	15,000					
Hidden creek.....	20,000					
Inonoaklin river.....						30,000
Kaslo creek, south fork.....						20,000
Kemball lake.....	10,803					
Kokanee creek.....			150,000	235,000		
Kootenay lake, west arm.....		80,000				
Kootenay river.....		45,000				
Little Slocan lakes.....						24,876
Loon lake.....						20,000
Porto Rico lake.....	15,000					
Redfish creek.....				100,000		
Salmon river.....	25,000					
Sitkum creek.....				105,000		
Six Mile creek.....				121,501		
Six Mile lake.....		25,000				
Slocan lake.....		50,000				
Slocan pool.....		35,000				
Slocan river.....	20,000	13,749				
Summit lake.....		20,000				
Whatsshan lakes.....	30,000					
Wilson lake.....	32,500					
New Westminster district—						
Jones lake, near Hope.....			50,000			
	441,303	408,749	425,000	561,501	60,000	184,876

Total distribution..... 2,081,429

PEMBERTON HATCHERY

	Kamloops Trout		Sockeye Salmon
	Eyed eggs	Fry	Fry
Alta lake.....		67,170	
Birkenhead river.....			23,493,960
Evans lake.....	7,500		
Forbes creek-Lac La Hache.....	30,000		
Gates river.....	50,000	50,000	
Gates lake.....	25,000	25,000	
Horse lake-Quesnel district.....	15,000		
McLeese lake-Quesnel district.....	30,000		
Millburn lake-Quesnel district.....	40,000		
Nita lake-Cheakamus river.....		5,000	
	197,500	147,170	23,493,960

Total distribution.....23,838,630

PENASK LAKE SUB-HATCHERY

	Kamloops Trout	
	Eyed eggs	Fry
Cranbrook hatchery.....	350,000	
Hatheume lake.....		40,000
Mildred lake.....	10,000	
Minnie lake.....	15,000	10,000
Mystery lake.....		5,000
Pothole lake.....	5,000	
Penask lake.....		514,758
Mud lake.....		20,000
Stanley Park hatchery.....	250,000	
	630,000	589,758

Total distribution..... 1,219,758

PITT LAKE HATCHERY

Four Mile creek-Pitt river	Sockeye salmon fry 2,879,380
Total distribution	2,879,380

QUALICUM BEACH PONDS (PROVINCIAL)

	Brown Trout		Kamloops Trout	
	Finger- lings No. 5	Year- lings	Fingerlings	
			No. 4	No. 5
Biological Research.....	102	100	25	25
Little Qualicum river.....		45,793		
Little creek.....		1,000		
Whiskey creek.....		2,000		
Quamichan lake.....				2,970
	102	48,893	25	2,995

Total distribution..... 52,015

DEPARTMENT OF FISHERIES

RIVERS INLET HATCHERY

	Sockeye Salmon	
	Eyed eggs	Fry
Owikeno lake—		
Asklum river.....		980,895
Dallick river.....		1,338,537
Genesi creek.....	5,588,782	
Indian river.....		784,707
Markwell river.....		915,502
Quap creek.....		3,562,474
Shumahault river.....	1,870,748	654,500
Shumahault bay.....		1,569,432
Wauquash river.....		653,900
	7,459,530	10,459,947
Total distribution.....	17,919,477	

SMITHS FALLS SUB-HATCHERY

	Cutthroat Trout Fingerlings No. 5	Steelhead Salmon	
		Fingerlings	
		No. 1	No. 5
Sumas river.....	12,281		
Sweltzer creek.....		232,580	35,107
Vedder river.....	52,000		
	64,281	232,580	35,107
Total distribution.....	355,010		

SUMMERLAND SUB-HATCHERY

	Kamloops trout eyed eggs	Kamloops trout fry
Okanagan district—		
Bomfield pond (Mr. Bomfield, Penticton).....		4,000
Brent lake.....		4,000
Coldstream creek-Long lake.....	80,000	
Deep creek.....	130,000	40,000
Dog (Shaha) lake.....	35,000	
Gilles lake-Dog (Shaha) lake.....		6,000
Glen lake.....		10,000
Hidden lake.....		5,000
Okanagan lake.....		176,023
Osoyoos lake.....	40,000	
Oyama lake.....	20,000	
Penticton pond (Penticton Rod and Gun Club).....		16,000
Silver lake.....		5,000
Shingle creek.....	100,000	
Snow lake.....	10,000	
Trepannier river.....		60,000
Vasseaux lake.....	20,000	
Vernon ponds (Vernon Fish and Game Association).....		50,000
Woods lake.....		20,000
Shuswap district—		
Echo lake.....		10,000
Mabel lake.....	120,000	
Sugar lake.....	60,000	
Similkameen river—		
Blue lake.....		5,000
Burgesson lake.....		10,000
Clearwater lake.....	10,000	
Davis lake.....		15,000
McKenzie lake.....		10,000
Missezula lake.....	60,000	
Murphy lake.....		4,000
Otter lake.....	40,000	
Osprey lake.....		10,000
Princeton rearing ponds, (Princeton Rod and Gun Club).....		100,000
Taylor lake.....		5,000
	725,000	565,023
Total distribution.....	1,290,023	

DOMINION OF CANADA

EIGHTH ANNUAL REPORT

OF THE

DEPARTMENT OF FISHERIES

(Seventy-first Annual Fisheries Report
of the Dominion)

FOR THE YEAR

1937-38



OTTAWA

J. O. PATENAUDE, I.S.O.

PRINTER TO THE KING'S MOST EXCELLENT MAJESTY

1938

*To His Excellency the Right Honourable Baron Tweedsmuir of Elsfield, P.C.,
G.C.M.G., C.H., Governor General and Commander-in-Chief of the
Dominion of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit herewith, for the information of your Excellency and the Parliament of Canada, the Eighth Annual Report of the Department of Fisheries, being the Seventy-first Annual Fisheries Report for the Dominion.

I have the honour to be,

Your Excellency's most obedient servant,

J. E. MICHAUD,
Minister of Fisheries.

DEPARTMENT OF FISHERIES,
OTTAWA, April 6, 1938.

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DEPUTY MINISTER'S REPORT

To the Hon. J. E. MICHAUD, M.P.,
Minister of Fisheries.

SIR,—I have the honour to submit the Eighth Annual Report of the Department of Fisheries, which is the Seventy-first Annual Report on the Fisheries of Canada and is for the fiscal year ended March 31, 1938. The Report makes reference to the following subjects, among others:—

- Results of Commercial Fisheries Operations in the Calendar Year 1937.
- Foreign Trade in Fisheries Products.
- Expanding the Demand for Canadian Fisheries Products.
- Survey of Dried and Pickled Fish Markets.
- Assisting Fishermen by Direct Aid.
- Fishing Bounty.
- Inspection and Instructional Work.
- Fish Culture.
- Oyster Culture.
- Returns from Pelagic Sealing.
- Trend in British Columbia Fisheries Employment.
- Activities of the International Fisheries Commission, or Pacific Halibut Commission.
- Work of the North American Council on Fishery Investigations.
- Establishment of the International Pacific Salmon Fisheries Commission.

The appendices include:—

- Reports of the Chief Supervisors of Fisheries.
- Report on the Department's Fish Culture Work.
- Report on Oyster Culture.
- Report on Fish Inspection and Technical Instruction to Fishermen.
- Report on Canned Salmon Inspection.
- Report of the Fisheries Engineer.
- Report on Scallop Investigation.
- A Statement of Fisheries Revenue and Expenditure for the Fiscal Year 1937-38 and a Summary of Revenue and Expenditure According to Provisions for the Period 1867 to 1937-38.
- A Statement Showing the Number of Fisheries Licenses Issued in 1937-38.
- A Summary Showing the Number of Lobster Fishing Licenses Issued Each Year Since 1928.

REVIEW OF THE FISHERIES FOR THE CALENDAR YEAR 1937

Canada's commercial fishermen made landings of fish and shellfish totalling 10,918,048 hundredweights during the calendar year 1937 and the catch had a marketed value of \$38,976,294. As compared with results for the calendar year 1936, there was a decrease of slightly more than 170,000 hundredweights in catch and slightly more than \$188,700 in marketed value. Sea fisheries production was valued at \$31,984,047 on the market and the production from the inland fisheries at \$6,992,247. The latter figure represented an increase of nearly \$778,700, but the value of the sea fisheries catch was more than \$967,000 below the

1936 figure. Value increased in Nova Scotia, New Brunswick, Ontario, Manitoba, Saskatchewan, and Alberta, but there were decreases in British Columbia, Quebec, Prince Edward Island and the Yukon Territory.

Major Fisheries.—Salmon landings for the year again exceeded in marketed value the return from any other of the Dominion's fisheries, although the quantity of salmon taken, 1,724,213 hundredweights, was less by some 305,500 hundredweights than the production in the preceding year. Salmon marketed value, \$12,370,200 roundly stated, decreased by a little more than \$1,497,000. The lobster fishery came next to the salmon fishery in point of marketed value return, and totalled in round figures \$4,633,400, as against something less than \$4,383,500 in 1936. The quantity of lobsters taken, 309,950 hundredweights, showed an increase of nearly 26,700 hundredweights. The cod, herring and whitefish fisheries came next in order, ranked according to marketed value. In the case of cod, the landings totalled 1,523,626 hundredweights, with a marketed value of \$3,140,230—a decrease of over 176,000 hundredweights on the one side and over \$191,000 on the value side. Herring catch, increasing by something more than 205,100 hundredweights, amounted to 3,057,503 hundredweights. Its marketed value was \$2,556,883, or between \$19,000 and \$20,000 less than in 1936. Whitefish landings and marketed value alike increased. The total catch of whitefish, all taken in inland waters, was 173,675 hundredweights, an increase of over 29,000. Its marketed value amounted to \$1,887,889, an increase of close to \$362,200.

Employment and Capital Investment.—The number of men engaged in primary operations of the industry, that is in catching and landing fish, was 69,967, or 1,968 fewer than were at work in 1936. Similarly there was a reduction of 1,455 in the number of persons employed in fish canning and curing plants. The number of workers in these plants in the earlier year was 15,238, as compared with 13,883 in 1937. All of the workers in the canning and curing plants were in the sea fisheries provinces. Of the men employed in primary operations 55,798 were engaged in the sea fisheries and 14,169 were employed in inland fishing operations.

Total capital investment in boats, vessels and equipment in use in primary operations and in buildings, machinery and equipment in use on shore was \$44,809,072, as compared with \$45,873,142 in 1936. In the case of vessels, boats, etc., the decrease was \$489,571 and in the case of shore plants and equipment \$574,499.

Marketed value of the 1937 fisheries production, by provinces, is shown in Table I below. Comparative figures for each of the four preceding years are also included in the table. Table II shows marketed value figures for the sea fisheries and inland fisheries, respectively, for 1937.

TABLE I

	1937	1936	1935	1934	1933
	\$	\$	\$	\$	\$
Nova Scotia.....	9,229,834	8,905,268	7,852,899	7,673,865	6,010,601
New Brunswick.....	4,447,688	4,399,735	3,949,615	3,679,970	3,000,045
Prince Edward Island.....	870,299	953,029	899,685	963,926	842,345
Quebec.....	1,892,036	2,108,404	1,947,259	2,306,517	2,128,471
Ontario.....	3,615,666	3,209,422	2,852,007	2,218,550	2,089,842
Manitoba.....	1,796,012	1,667,371	1,258,335	1,465,358	1,076,136
Saskatchewan.....	527,199	367,025	252,059	219,772	186,417
Alberta.....	433,354	309,882	225,741	245,405	144,518
British Columbia.....	16,155,439	17,231,534	15,169,529	15,234,335	12,001,471
Yukon Territory.....	8,767	13,385	20,725	14,625	17,100
Totals.....	38,976,294	39,165,055	34,427,854	34,022,323	27,496,946

TABLE II

	Sea	Inland	Total
	\$	\$	\$
Nova Scotia.....	9,229,834	.....	9,229,834
New Brunswick.....	4,420,251	27,437	4,447,688
Prince Edward Island.....	870,299	.....	870,299
Quebec.....	1,308,224	483,812	1,892,036
Ontario.....	.....	3,615,666	3,615,666
Manitoba.....	.....	1,796,012	1,796,012
Saskatchewan.....	.....	527,199	527,199
Alberta.....	.....	433,354	433,354
British Columbia.....	16,155,439	.....	16,155,439
Yukon Territory.....	.....	8,767	8,767
Totals.....	31,984,047	6,992,247	38,976,294

ATLANTIC COAST SEA FISHERIES RESULTS*

In the following table the total commercial catch of sea fish and shellfish on the Atlantic coast is shown by provinces for each of the calendar years 1937 and 1936:

	1937	1936
	lbs.	lbs.
Nova Scotia.....	270,307,800	265,092,200
New Brunswick.....	137,790,700	158,645,000
Prince Edward Island.....	27,525,000	24,813,800
Quebec.....	71,593,600	89,259,400
Total Landings.....	507,217,100	537,810,400

Cod, Haddock, Hake and Cusk and Pollock.—During 1937 the landings of these species of fish on the Atlantic coast totalled 2,367,209 hundredweights, as compared with 2,449,253 in the preceding year. The marketed value of the catch showed a decrease of slightly more than \$100,000, totalling \$4,914,789, as against \$5,028,060 in the earlier year. There was a large increase, not very much less than 100 per cent, in the 1937 catch of pollock, which totalled \$239,845. Hake and cusk landings, 229,200 hundredweights, roundly stated, increased slightly, but in the catch of both hake and cod the year's production was smaller than in 1936. Haddock catch, 388,823 hundredweights, was about 14,000 below the figures for the preceding year, but the marketed value, \$1,296,313, increased a little. Total catch of cod was 1,509,320 hundredweights, with a marketed value of a trifle less than \$3,098,000. The decrease on the production side was about 182,000 hundredweights, and in the case of value there was a drop of a little more than \$200,000.

Nova Scotia, which produced much more cod than any other province, increased its landings somewhat during the year and there was a small gain in Prince Edward Island. On the other hand, there was a decrease in New Brunswick, but the major reduction was in Quebec, which ranks second only to Nova Scotia in importance as a producer of cod. In 1936 Quebec's landings were 418,950 hundredweights, but in 1937 they dropped to less than 232,000. Out of the total haddock landings all save about 3,800 hundredweights were taken by Nova Scotia fishermen and their catch was approximately 6,800 hundredweights less than in the year before. In each of the other three Atlantic provinces fewer haddock were taken than in the preceding year, New Brunswick alone among the provinces showing a reduction in the catch of hake and cusk.

Both in New Brunswick and Nova Scotia, the pollock producing provinces, there were large increases in the year's landings. In New Brunswick the catch of 1,333,360 hundredweights was considerably more than twice as large as it had

* See also "Inland Fisheries" on page 12 for inland New Brunswick and Quebec, and the Eastern Chief Supervisor's report beginning on page 30.

been in 1936, while in Nova Scotia there were landings of 106,485 hundredweights, as compared with 75,210. Total pollock market value, slightly more than \$222,000, was not far short of being twice as large as in the year before.

Dried Fish Production.—Some increase took place in the production of dried fish (cod, haddock, hake and cusk, and pollock) which amounted to 261,285 hundredweights, as compared with 234,960 in 1936. Marketed value of the production, \$1,123,552, showed an increase of something over \$133,000. Much the greater part of the dried fish put up consists of cod, with Nova Scotia the largest source of supply. The year's output of dried cod was 189,930 hundredweights, which meant a small gain over the 1936 figures. A sharp drop in the Quebec production was an adverse feature. In Nova Scotia there was a substantial increase and a relatively large increase in New Brunswick. In Prince Edward Island there was a decrease but the dried fish industry is not conducted on a large scale in the Island province. The quantity of dried cod put up in Quebec, however, was less than half as large as it had been in the preceding year—26,700 hundredweights roundly stated, as compared with 58,200. Total marketed value of the dried cod put up in all four provinces was almost \$923,500 or an increase of roughly \$40,000. With the pollock catch increasing materially there was naturally an increase in the quantity of the fish put up in the dried form, approximately 48,560 hundredweights, as against 31,160. Pollock marketed value exceeded \$130,000, an increase of some \$58,000. The output of dried hake and cusk fell off in New Brunswick, showed some increase in Prince Edward Island, but was very much greater in Nova Scotia than it had been in 1936. The net result was that aggregate production was 21,470 hundredweights as against a little more than 13,500 hundredweights, and marketed value, \$65,264, was nearly twice as great as the value total for the earlier year. A slight increase took place in the production of dried hake, but only a comparatively small quantity of haddock is dried.

The total quantity of boneless fish put up on the coast, 24,245 hundredweights, was not quite as large as the 1936 production.

Herring, Mackerel and Sardines.—In the case of the herring fishery, there were increased landings both in Quebec and Prince Edward Island, but there was a drop in New Brunswick, the largest Atlantic producer of herring, and another drop in Nova Scotia. Total herring catch on the coast, 1,077,472 hundredweights, was about 100,000 hundredweights less than in 1936. A large increase in Quebec's landings of mackerel was the main factor in bringing the total production of these fish to 239,163 hundredweights or 12,500 hundredweights above the 1936 figures. The Quebec catch, 41,840 hundredweights, was two and one-half times as great as it had been in 1936. There was a small increase in Prince Edward Island catch, a small decrease in New Brunswick and a fairly substantial drop in Nova Scotia. Mackerel marketed value reached a total of \$635,740, an increase of more than \$170,000.

Practically all of the catch of sardines is taken in southwestern New Brunswick, but in 1937 the landings there were slightly less than 317,700 hundredweights, as compared with more than 492,000 hundredweights in the preceding year. On the other hand, the output of canned sardines increased, totalling a little more than 423,000 cases, as compared with 393,854 cases. The marketed value of the canned output was \$1,458,800, roundly stated, an increase of about \$77,000.

Flounders, Halibut and Swordfish.—Flounder production for the year increased quite sharply with an accompanying rise in total landed value, and there was also increased catch of halibut, but the landings of swordfish, all made by Nova Scotia fishermen, totalled only 15,020 hundredweights, as against more than 17,800 in 1936. The greater part of the flounder catch was taken by Nova Scotia fishermen, as usual. Nova Scotia landings of these fish, 10,445 hundredweights, increased by about 3,800. There was little change in the flounder figures in the other provinces. By far the greater part of the Atlantic catch of

halibut is also taken by Nova Scotia fishermen and during the year under review they landed a few hundredweights more than they had taken in 1936, or 31,301 hundredweights, as compared with 31,044. Quebec's landings increased, but in New Brunswick, a small producer, there was a reduction.

Salmon and Other River Spawning Fish.—The year's catch of salmon, 30,361 hundredweights, was slightly less than it had been in the preceding year, when 31,931 hundredweights were landed. In New Brunswick the landings were 15,637 hundredweights, in Nova Scotia 4,647 hundredweights and in Prince Edward Island 10 hundredweights—decreases in all three cases. In Quebec, however, the landings amounted to 10,067 hundredweights, as against 9,317. Smelt landings decreased in each of the four provinces with a drop of more than 21,000 hundredweights in New Brunswick, where the greater part of the annual smelt landings is taken. Total catch for the coast was slightly more than 66,000 hundredweights, as against 93,000 roundly stated in the preceding year. There was also a sharp reduction in the New Brunswick catch of alewives with a result that although landings of these fish increased, both in Nova Scotia and Prince Edward Island, the two other producing provinces, the catch for the coast as a whole, 73,854 hundredweights, was more than 14,000 hundredweights below the 1936 figure. New Brunswick landings of alewives totalled 43,113 hundredweights, as compared with 61,122. In Nova Scotia the catch was 29,078 as against 26,707, and in Prince Edward Island, 1,663, as against 344 hundredweights.

Lobsters.—With the catch totalling 309,950 hundredweights, the landings of lobsters which are taken only in our Atlantic coast waters, showed an increase of more than 26,000 hundredweights over the production of the preceding year. Total marketed value, \$4,633,429, showed an increase of \$250,000. The net increase in landings was due to more successful fishing in the waters of Nova Scotia and New Brunswick than the fishermen had experienced in 1936. In both these provinces the catch increased quite sharply, in New Brunswick by some 16,000 hundredweights and in Nova Scotia by nearly 13,900.

The following table gives the statistics of catch, pack, shipments in shell, meat and tomalley, for the several provinces for the years 1937, 1936, 1935 and 1934:—

CATCH

	1937		1936		1935		1934	
	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$		\$		\$
Nova Scotia.....	158,961	2,757,880	145,091	2,570,274	176,836	2,732,872	184,590	2,487,633
New Brunswick...	72,586	1,089,002	56,499	916,850	54,831	818,699	65,073	812,045
Prince Edward Island.....	58,238	538,792	59,286	614,789	63,876	605,107	76,582	674,186
Quebec, including Magdalen Ilds...	20,165	247,755	22,397	281,515	24,426	222,064	35,747	295,900
(Magdalen Ilds.)	17,304	199,527	19,696	251,426	21,707	193,765	30,343	240,640
*Totals.....	309,950	4,633,429	283,273	4,383,428	319,969	4,378,742	361,992	4,269,764

SHIPPED IN SHELL

Nova Scotia.....	89,904	1,816,045	73,158	1,535,573	90,840	1,652,082	91,418	1,365,094
New Brunswick...	23,528	422,708	19,750	375,899	20,537	381,092	22,135	311,446
Prince Edward Island.....	2,064	26,153	2,743	35,939	2,991	32,430	3,546	38,704
Quebec, including Magdalen Ilds...	8,057	101,623	7,134	86,276	783	8,200	5,827	54,273
(Magdalen Ilds.)	6,058	64,148	5,842	72,668	.....	.....	3,468	30,709
*Totals.....	123,553	2,366,529	102,785	2,033,687	115,151	2,073,804	122,926	1,769,517

* Totals are for the four provinces.

DEPARTMENT OF FISHERIES

QUANTITY CANNED

	1937		1936		1935		1934	
	Cases	Marketed Value	Cases	Marketed Value	Cases	Marketed Value	Cases	Marketed Value
		\$		\$		\$		\$
Nova Scotia.....	34,649	817,814	37,690	960,621	46,863	1,021,258	50,553	1,036,487
New Brunswick...	26,957	624,128	20,428	512,055	18,275	404,260	23,815	477,999
Prince Edward Island.....	20,952	497,846	22,345	563,286	25,170	556,596	30,214	624,771
Quebec, including Magdalen Ilds...	6,023	144,332	7,639	194,005	9,597	213,519	11,562	241,417
(Magdalen Ilds.)	5,623	134,448	6,927	177,714	8,656	193,615	10,097	209,907
* Totals.....	88,581	2,084,120	88,102	2,229,967	99,905	2,195,633	116,144	2,380,674

TOMALLEY

Nova Scotia.....	3,588	37,250	3,668	35,512	3,528	33,560	3,418	30,951
New Brunswick...	1,215	10,039	1,174	9,796	617	4,497	479	3,200
Prince Edward Island.....	1,155	11,935	1,499	15,564	1,358	15,661	1,149	9,386
Quebec, including Magdalen Ilds...	174	1,080	128	1,234	36	345	35	210
(Magdalen Ilds.)	155	931	108	1,044	15	150	4	24
* Totals.....	6,132	61,235	6,469	62,106	5,539	54,063	5,081	43,747

LOBSTER MEAT

	1937		1936		1935		1934	
	Cwts.	Marketed value	Cwts.	Marketed value	Cwts.	Marketed value	Cwts.	Marketed value
		\$		\$		\$		\$
Nova Scotia.....	1,149	86,771	535	38,568	510	25,972	1,077	55,101
New Brunswick...	635	32,127	382	19,100	577	28,850	388	19,400
Prince Edward Island.....	62	2,858	.....	.....	6	420	29	1,325
Quebec, including Magdalen Ilds...	12	720	.....	.....	.....	.....	.....	.....
(Magdalen Ilds.)	.....	.....	.....	.....	.....	.....	.....	.....
* Totals.....	1,858	122,476	917	57,668	1,093	55,242	1,494	75,826

* Totals are for the four provinces.

Other Shellfish.—Scallops, oysters and clams, among the other shellfish, were all taken in increased quantities in 1937. Only in the case of quahaugs, or hard-shelled clams, was there a reduction, and that a small one. New Brunswick and Prince Edward Island are the main producers of quahaugs and in the former province the year brought a slight decrease, while in Prince Edward Island there was a gain. In Nova Scotia production fell off. Taking the three provinces together, the quahaug landings amounted to 2,282 barrels as compared with 2,351 in 1936. The landed value of catch, \$9,217, showed a small reduction. In the case of the scallop fishery which, for the most part, is carried on in western Nova Scotia, the total catch, 183,755 gallons (shelled), was about 13,000 gallons greater than in 1936, but prices were weaker than in the earlier year with the result that total marketed value was only \$296,529 as against approximately \$334,400. The increase in landings was all in Nova

Scotia. In New Brunswick the landings decreased quite sharply and in Quebec there was also a reduction, although the scallop fishery is not important in that province.

An increase in New Brunswick landings of oysters was responsible for lifting the total production for the coast to 22,355 barrels, or about 1,580 barrels more than were taken in the preceding year. In New Brunswick the catch increased from 9,109 barrels in 1936 to 11,546 barrels in the past year. In Prince Edward Island the landings were 6,478 barrels or some 260 barrels less than in the earlier year. The Nova Scotia catch, 4,331 barrels, showed a drop of close to 600 barrels. The total marketed value of the oyster catch for the coast as a whole was nearly \$143,900, an increase of something more than \$13,000.

Clam catch increased by some 4,700 barrels in New Brunswick and by nearly 1,600 barrels in Prince Edward Island, but there was a decrease of more than 3,400 barrels in Nova Scotia and a drop of 640 barrels in Quebec. Total clam landings for the coast, 48,197 barrels, had a marketed value of \$144,813. As compared with 1936, there was an increase of nearly 2,300 barrels on the quantity side and about \$40,300 on the marketed value side.

PACIFIC COAST FISHERIES

During the year British Columbia's commercial fishermen made catches aggregating in all 4,954,195 hundredweights with a marketed value roundly stated of \$16,155,500. On the catch side there was an increase of about 57,000 hundredweights over the 1936 figures but in the case of marketed value there was a decrease of about \$1,076,000. This drop in value was mainly due to reduction in the returns from the salmon fishery, which is the most important single fishery of the Dominion.

The catch of salmon was slightly less than 1,692,000 hundredweights as compared with almost 1,995,500 in 1936. With the reduction catch there was of course a reduction also in the amount of canned salmon put up in the province. All told the marketed value of the year's salmon production was \$11,908,000 in round figures as compared with nearly \$13,387,400 in 1936. Decreases in the packs of chums and cohoes were the main features in pulling the year's total pack of salmon down to about 1,508,600 cases as against slightly more than 1,881,000 cases in the preceding year. There was a fairly substantial reduction in the quantity of salmon dry salted during 1937 and there were relative small decreases also in the output both of salmon oil and salmon meal.

Halibut.—The landings of halibut by British Columbia fishermen again showed an increase reaching 117,200 hundredweights (odd figures have been dropped) as compared with slightly more than 105,900 hundredweights in 1936. On the marketed value side there was an increase of something more than \$150,000, the year's total exceeding \$1,190,000.

Herring.—There was an increase of more than 300,000 hundredweights in the year's landings of Pacific herring. In 1936 the herring catch was 1,620,625 hundredweights, but in 1937 the figure increased to 1,929,795. The increase in marketed value, however, was only about \$40,000 with total value amounting to a little less than \$1,181,500. With disturbed marketing conditions in the Orient where all of British Columbia's pack of dry salted herring is marketed, the year's output from the salteries, 203,400 hundredweights, showed a decrease of nearly 180,000 hundredweights. The production of herring meal increased by more than 4,000 tons, and reached 14,427 tons. There was a large increase in the quantity of herring oil produced, or 1,283,658 gallons as compared with 782,499 gallons in 1936.

Pilchards.—As in the herring fishery, so in the pilchard fishery, there was an increase in catch. All told, slightly less than 961,500 hundredweights of pilchards were taken or about 72,500 hundredweights more than in the earlier year. The quantity of pilchard oil produced rose from 1,217,100 gallons, using round figures again, to a little less than 1,707,300 gallons. On the other hand, the output of pilchard meal decreased by a couple of hundred tons. Total marketed value of the year's pilchard catch, \$902,619, showed an increase of something more than \$235,000.

Other Fisheries.—Fewer whales were taken—317 as compared with 370 that were landed in 1936. However, the marketed value of the catch increased by \$48,000 and amounted to \$220,251. The increase in value was due to firmer prices for whale oil, only 662,355 gallons of the oil were produced as compared with more than 763,700 gallons in 1936, but the value \$197,227 increased by nearly \$52,500.

The catch of grayfish or dogfish, 113,220 hundredweights, was not quite as large as the 1936 catch and there were decreases in the quantities of meal and oil put up. On the marketed value side there was a decrease of over \$2,900. There was a sharp drop in the ling cod catch, which fell from 68,932 hundredweights in 1936 to 42,858 hundredweights. In the oyster and clam fisheries production was smaller than in 1936. The crab fishery showed some increase and the shrimp landings, never very large, were substantially greater than in the previous year. The landings of black cod rose quite sharply, but was a decrease in the catch of red and rock cod. More cod (or grey cod) were landed than in the year before.

INLAND FISHERIES

As pointed out in a previous paragraph there was an increase in the marketed value return from the inland fisheries in 1937. In 1936 the production from these inland or freshwater fisheries was valued on the market at \$6 213,-551, but in 1937 the figures increased to \$6,992,247. The dollar return increased in Ontario, Manitoba, Saskatchewan, Alberta and New Brunswick, but decreased in Quebec and the Yukon Territory. (Both New Brunswick and Quebec, of course, have important sea fisheries as well as freshwater fisheries). The greatest gain, something like \$406,000 was in Ontario.

The following table shows the landings of the principal varieties of freshwater fish in 1937 and each of the four precedings years:—

	1937	1936	1935	1934	1933
	cwt.	cwt.	cwt.	cwt.	cwt.
Whitefish.....	173,681	144,603	147,456	144,615	152,135
Pickrel (or dore).....	143,020	145,635	109,548	122,512	106,272
Tullibee.....	56,703	59,265	39,721	44,076	42,300
Trout.....	70,588	72,825	66,242	58,848	50,734
Pike.....	51,320	54,370	44,761	37,195	41,146
Herring.....	50,236	50,919	34,536	37,992	34,180
Perch.....	34,672	31,090	71,153	72,139	40,367
Eels.....	18,930	22,064	23,063	22,970	24,950
Blue pickrel.....	94,496	68,995	51,230	24,321	42,164
Carp.....	17,844	17,770	21,026	21,328	18,545
Goldeyes.....	6,402	5,902	3,341	3,306	2,876

Whitefish are the most important commercial species occurring in Canada's inland areas and it will be noticed from the table that the catch of these fish in 1937 was considerably greater than the average production in the 1933-1936

period. Of the total whitefish landings last year more than 55,000 hundredweights were taken by Ontario fishermen but 32,300 hundredweights came from Manitoba waters, over 54,700 from Saskatchewan fisheries and 27,800, roundly stated, were caught in Alberta. The whitefish landings in Quebec were about 3,500 hundredweights but in New Brunswick and the Yukon the production of these fish is always small. Ontario's 1937 landings were not as large as the catch in that province in 1936 but in each of the Prairie Provinces the catches increased.

The pickerel catch, although not quite as large as in 1936, was substantially greater than it had been in 1935, 1934 or 1933. Manitoba continued to produce by far the greater part of the total pickerel catch or nearly 104,100 hundredweights out of 143,020. Blue pickerel, taken only in Ontario waters were landed in greater quantity than in the preceding year. In 1936 the catch was nearly 69,000 hundredweights but in 1937 it rose almost to 94,500 hundredweights.

Total commercial landings of trout, 70,588 hundredweights, were not quite as large as they had been in 1936 but marketed value increased. In the earlier year the trout catch was worth approximately \$841,000 but in the year under review the value reached more than \$1,031,000.

EXPORT TRADE HIGHER

Canada's export trade in fisheries products in 1937 reached the highest value level since 1930 and at \$28,833,900, roundly stated, it exceeded the business for 1936 by nearly \$3,500,000. In 1930 the exports were valued at \$31,845,000, round figures again being used here as in all the trade references in these paragraphs, but during the following two or three years the world-wide economic disturbance that was in progress brought a succession of decreases. By 1932 the Dominion's fisheries export business had reached the low level of \$18,736,000. Gradual improvement then set in but 1937 brought the largest single gain, as will be seen from the following table:—

1932..	\$18,736,000
1933..	20,206,000
1934..	22,486,000
1935..	24,839,000
1936..	25,358,000
1937..	28,833,000

(Odd figures have been dropped in all cases. All classes of fisheries products and by-products have been taken into account in making up the table, although in some trade reports the exports of fish meal and oil are shown separately from fisheries exports generally).

The United States and the United Kingdom are the biggest export customers of the Dominion's fishing industry. Sales to both countries brought increased returns in 1937. Shipments to the United States were valued at slightly more than \$13,980,700, or about \$1,070,000 more than in the preceding year. Purchases by the United Kingdom were worth \$928,100 more than in 1936 and amounted to \$6,680,100. Countries other than the United Kingdom and the United States purchased Canadian fisheries products valued, in all, at \$8,173,000, which meant that there was an increase of \$1,477,000 over the sales made to them in the year before. The improvement in 1937 export business was thus not due to increased trade with one or two important customers alone but was accounted for by general betterment.

Another point of interest and significance is that just as increased business was done with most export markets, each of the major classes of Canadian fisheries products contributed to the year's value gain. Fisheries exports fall into five main classes and the 1937 trade in each group of commodities was greater in value than it had been in the preceding year.

The major part of the total increase of approximately \$3,500,000 was contributed by the canned fish class and by fresh and frozen fish. Sales of fresh and frozen fish to other countries amounted to \$12,182,300, which was something more than \$1,000,000 above the 1936 figures. The great bulk of the export shipments of fish in these forms goes, of course, to the United States, with live lobsters the most important single product, reckoning on the dollar basis. It is worth noting, however, that 1937 again brought a substantial increase in the sales to Britain of fresh and frozen salmon and halibut. Trade with the Old Country in these products has been of comparatively recent development but in '37 nearly 6,100,000 pounds of fresh and frozen salmon, with a value of \$915,500, were shipped to the United Kingdom. As compared with 1936 business, there was a rise of more than 1,607,000 on the poundage side and \$277,300 in value. Incidentally, it may be pointed out that Canada also shipped salmon to Belgium, France, Germany and the Netherlands in Europe and to such more distant markets as Australia, Japan and the Straits Settlements. The quantities sent to Australia and the Straits Settlements were small, although, as a matter of fact, the trade with Australia was larger than in 1936. To the layman it might seem surprising that frozen fish can be delivered so far away from point of production while still in sound condition but Canadian fish freezing methods and the storage facilities provided by transportation systems have been made so efficient in recent years that trade with distant markets is quite feasible.

Shipments of frozen halibut to Great Britain during the year were not as large in the aggregate as the shipments of salmon but they exceeded those made in 1936 by more than 383,000 pounds and amounted in all to 2,023,100 pounds. Most of the fish was from British Columbia and it was worth slightly more than \$213,500, as against \$155,630 in the year before. Some halibut also went to Australia and Belgium, and a small quantity to the Netherlands. Sales to the United States, the Dominion's biggest export market for fresh and frozen halibut, totalled 4,724,000 pounds, an increase of about 136,000 pounds.

Canned salmon was first in importance among the products entering into the export business in canned fish, with lobsters and sardines coming next in order. Practically all of the salmon was shipped from British Columbia while the lobsters and sardines were all from the Atlantic Coast. No sardines are put up in British Columbia and lobsters occur in Atlantic waters only. Total exports of all kinds of canned fish and shellfish were worth \$10,608,800, which topped the 1936 value total by nearly \$1,433,000. Canned salmon accounted for over \$7,533,600, canned lobsters for \$1,984,170, and canned sardines for \$693,900. The business in salmon increased by nearly 12,000,000 pounds in quantity and by \$1,166,300 on the value side. In the case of canned sardines the total exports, 7,864,300 pounds, were greater by 2,400,000 pounds than in 1936 and their value showed an increase of over \$220,000. On the other hand, exports of canned lobsters decreased by about 100,000 pounds in quantity and about \$96,000 in value, with shipments aggregating 3,716,700 pounds and having a value of slightly less than \$1,984,200.

Canned salmon was shipped to more than thirty different export markets but the biggest buyers were the United Kingdom, Australia, France, the United States, New Zealand and British South Africa. The major trade in canned lobsters was done with Britain, the United States, Sweden and France. Reduction in the sales to France was the main factor in bringing the total canned lobster trade below the 1936 level. More than twenty export markets made purchases of sardines but the combined business with British South Africa and Australia made up more than half of the total trade which the sardine canners did abroad.

The year's exports of dried, smoked and pickled fish, \$3,982,500, showed a gain of about \$380,000. Over half of the increase was in the trade in dried cod, hake and cusk and pollock—an encouraging fact in view of the very unsatisfactory state of affairs which has existed in the dried fish markets in the past few years. The value of the exports of fish and whale oils, \$849,000, showed an increase of about seventy per cent. There was an increase in a little more than \$375,000 in the business in miscellaneous products, which were valued all told at \$1,210,300.

While export trade increased by about 13 per cent, in value in 1937, as compared with 1936 totals, the year's import trade in fisheries products was not quite as large as it had been in the earlier year. All told, the imports were valued at very slightly less than \$2,773,000 as against \$2,809,700. Canned fish imports were \$1,002,600 or not so very much less than half of the total import value. The principal canned imports were sardines, most of them from Norway, crabs, lobsters and tuna. Most of the crabs came from the United States and Japan, and the greater part of the canned tuna from Japan. The imports of canned lobster were from Newfoundland.

The more important incoming fisheries products, apart from canned fish, were shelled oysters, from the United States; fresh salmon, most of it from Newfoundland; unrefined cod liver oil, from Newfoundland, Norway, the United States and Britain; seal oil, from Newfoundland; and pickled herring, principally from the Netherlands, the United Kingdom, the United States and Newfoundland.

EXPANDING DEMAND FOR FISH PRODUCTS

During the fiscal year the department continued nation-wide advertising such as it had carried on in 1936-37 to assist the fishermen of the Dominion by expanding the demand for their products. Representative persons in the fishing industry had testified to the helpfulness of the earlier year's advertising, and the Canadian Fisheries Association had formally recorded its opinion that the campaign had been productive of gratifying results to the benefit of the fishermen and the fish trade, but it was recognized that further action was desirable. The great need of the Dominion's fishing industry is extension of markets but no single campaign of advertising could be expected to bring about the maximum possible increase in market demand for fish foods within Canada.

The program followed in 1937-38 was much the same as that which had been undertaken in the preceding year, although a reduced appropriation made it necessary to change somewhat the scale of the campaign. Daily and weekly newspapers, national magazines, labour and farm journals and several other classes of publications were used as media to bring the merits of Canadian fish foods to the attention of consumers in every part of the country. Certain groups of trade papers were also used with a view, in some cases, to leading the proprietors of public dining rooms to make greater use of fish in catering to their patrons and, in other cases, with a view to stimulating the interest of provision merchants in marketing fish products. The campaign began in October and continued month by month until the close of the fiscal year and, all told, some 900 different publications were used.

As in the preceding year, each advertisement, except in the case of some of those appearing in trade papers, included a coupon entitling the holder to a free copy of the departmental cook book, *Any Day a Fish Day*. Through the distribution of the cook book it was sought, of course, to give information to women of the country as to nutritive and health value of fish foods and methods of preparing them for the table, and thus to lead housewives to make greater use of Canadian fish and shellfish. In the 1936-37 campaign there had been a very large return of coupons from the advertisements and it was scarcely to be expected

that the return in 1937-38 would be of similar proportions. As a matter of fact, however, the number of coupon applications received went well beyond the 40,000 mark. In addition, many requests for cook books were received from women whose attention had been caught by the advertisements but who did not clip out the coupons. Further, many women's organizations—farm-erette circles, women's institutes, and so on—asked that copies of the cook book be sent to their members, and the requests, of course, were met, as were requests from numerous domestic science instructors that booklets be sent their pupils.

Several other steps were taken during the year to increase the use of fish products within the Dominion. Two fish cookery lecturer-demonstrators were kept in the field, giving addresses (mainly, of course, to gatherings of women) on Canadian fish foods, their uses and merits and holding cookery demonstrations. Attendance at the individual meetings and demonstrations ran from comparatively small numbers in some cases to several hundred persons in others but in the aggregate it reached well up into the thousands. In addition to doing work at meetings and demonstrations of this kind the lecturer-demonstrators also gave courses of instruction, on request, at a number of household science schools and summer schools for teachers.

During the year frequent use was made of the department's motion picture, *Food for Thought*, which is illustrative of the fishing industry and indicates the excellence of the Dominion's fish foods. Under arrangements made by the department the picture, which is a sound film, was shown in a large number of theatres in all of the provinces. It was also shown at the Canadian National Exhibition in Toronto and the National Produced-in-Canada Show in Montreal, coming in this way to the attention of very large numbers of people. It was likewise supplied, on loan, for showing at gatherings under the auspices of several different organizations. Effective use was made of the picture in the travelling theatre car operated in Western Canada by the Canadian Forestry Association. Arrangements made with the association to have the picture shown in this travelling theatre, which is operated for educational purposes, enabled the department to emphasize the merits of fish foods and the national importance of the fishing industry to the people of many small communities who otherwise could not have been reached effectively. Not only was the picture shown in these communities but under the arrangements made by the department with the association the officials in charge of the car saw to the distribution of fisheries pamphlets and cook books among the people of the different localities at which programs were given.

In 1936-37 the department supplemented from its appropriations the funds available to the High Commissioner in London for advertising Canadian products in the United Kingdom through the "Canada Calling" campaign of publicity, and in the year just past the same course was taken. Fifteen thousand dollars were transferred by the department for the use of the High Commissioner's Office on the understanding that the money would be spent for the purpose of increasing the advertising which was to be given fisheries products in the campaign.

As a further step to assist in expanding sales in the British market the department also made \$5,000 from its appropriations available to the Department of Trade and Commerce for use in carrying out plans for an effective canned salmon exhibit at the Empire Exhibition at Glasgow, Scotland.

SURVEY OF DRIED AND PICKLED FISH MARKETS

As a necessary preliminary to sound steps toward improving the position of the dried and pickled fish branches of the Atlantic Coast fishing industry, which has been experiencing some conditions of special difficulty during the past few years, action was taken during the past year to have a survey of important markets for Canadian dried and pickled fish carried out by persons thoroughly acquainted with production and marketing. Mr. O. F. MacKenzie, president of Halifax Fisheries, Limited, Halifax, and Mr. F. Homer Zwicker, of Zwicker and Company, Lunenburg, were selected to make the survey. Both gentlemen, and the respective companies with which they are associated, have had much experience in the dried and pickled fish trade. Their appointment to carry on the work in question was made by Order in Council early in January. Under its terms Mr. MacKenzie and Mr. Zwicker were instructed to investigate conditions in the markets for dried and pickled fish products in the United States (including Puerto Rico), Central America, South America, and the West Indies, to submit written reports to the Minister of Fisheries, and to make recommendations "as to what steps should be taken to aid adequately in the re-establishment of the Canadian dried and pickled fish industries by bringing about the sale of growing quantities of the products of these industries in these markets at remunerative prices."

Prior to beginning the survey, Mr. Zwicker and Mr. MacKenzie consulted with boards of trade and other interests in several Atlantic centres concerned in an important way in the dried and pickled business so that problems and needs, as seen from within Canada, could be discussed. By arrangement between them, both gentlemen went to the United States and Jamaica and to Havana in Cuba, but they felt that it was unnecessary that both should visit all the other markets which it was planned to cover. Mr. Zwicker therefore went to Santiago de Cuba, the Panama Republic, Trinidad, Puerto Rico and Haiti, while Mr. MacKenzie made the survey in the Dominican Republic, British Guiana, Dutch Guiana, Brazil and Argentina. Their reports were submitted to the Minister at the end of March.

ASSISTING FISHERMEN BY DIRECT AID

Continuing the preceding year's plan of assisting needy fishermen through joint federal-provincial action, direct aid was given during 1937-38 to 9,176 individual fishermen and 28 associations of fishermen in the three Maritime Provinces and the Magdalen Islands area of Quebec, where the fisheries are under Dominion administration either in whole or in part. British Columbia, the fifth province where the federal authorities have to do with administration of the fisheries, did not join in the plan.

The year's loans and grants, plus the cost of a few miscellaneous aids to fishermen, made up a total of \$327,041.33. Of this amount the Department of Fisheries contributed \$218,004.21 from an appropriation voted by Parliament for assisting fishermen directly. The remainder of the money was contributed by the co-operating provinces. In other words, the principle followed in setting up the fishermen's aid fund created in each province was that the department contributed two dollars for each dollar made available by the provincial government.

In carrying out the plan agreements were made between the Dominion, as represented by the Minister of Fisheries, and the respective provincial governments concerned. Under each agreement the rate of interest to be charged

on loans was subject to the approval of the minister but administration of the loan fund was made a provincial responsibility to be carried out by local voluntary committees chosen by the province. The work of the committees was made subject to the supervision of a central board provincially appointed. A further condition of each agreement was that "repayment of loans to the province shall be credited to a fund which shall be used by the province for making similar loans in future years." Each agreement specified the maximum amounts which the department and the province, respectively, undertook to contribute to the aid fund but in two of the provinces, New Brunswick and Nova Scotia, the provincial administrative bodies did not require the full amounts available.

In Nova Scotia 2,179 fishermen obtained loans amounting in all to \$80,996.26 and loans to 16 associations of fishermen totalled \$18,105, and of the aggregate amount thus lent, \$99,101.26, the department contributed \$66,067.52. Individual fishermen to the number of 3,190 received grants in New Brunswick and loans were made to two associations in the province. The association loans amounted to \$3,000 and the grants to fishermen, together with expenditures on some miscellaneous aids, aggregated \$72,016.62. Total outlays from the fund for New Brunswick were thus \$75,016.62, with the department's share \$50,011.06.

In Prince Edward Island the loans to 2,315 fishermen and eight associations made up \$60,243.58. In addition there was an expenditure of \$17,539.87 on miscellaneous steps taken to assist the fisheries people. In all, then the direct aid given in the province from the federal-provincial fund was \$77,783.45, and of this sum \$51,855.63 came from the department's appropriation.

In the Magdalen Islands, which, as has been indicated in an earlier paragraph, are the only part of Quebec where the fisheries are under federal administration, loans were made to 1,492 fishermen (\$70,537.28) and to two associations, which between them borrowed \$4,602.72. The department contributed \$50,070 of the total amount of \$75,140 paid out on loan in the islands.

FISHING BOUNTY PAYMENTS

During the year a total of \$159,857.25 was paid in fishing bounties on the Atlantic coast under authority of "An Act to Encourage Development of Sea Fisheries and Building of Fishing Vessels." Of this amount, \$15,747.90 was paid to owners of fishing boats and vessels and to fishermen in Prince Edward Island, \$19,272.90 to similar groups in New Brunswick, \$38,427.35 in Quebec, and \$86,409.10 in Nova Scotia. The aggregate number of fishing boat owners receiving bounty was 9,981 and the number of vessel owners 541. Boat fishermen to whom bounty was paid numbered 16,862 and vessel fishermen 2,953. Distribution of bounty by counties in the four provinces is shown in a table which is given below.

The basis of distribution for 1937 was as follows: (1) To owners of vessels entitled to receive bounty, \$1 per registered ton, payment to the owner of any one vessel not to exceed \$80; (2) to vessel fishermen entitled to receive bounty, \$7.60 each; (3) to owners of boats measuring not less than 12-foot keel, \$1 per boat; (4) to boat fishermen entitled to receive bounty, \$6.90 each.

1937-38

Province and County	Boats	Men	Amount	Vessels	Tons	Average Tons	Men	Amount	Total Amount
			\$ cts.					\$ cts.	\$ cts.
<i>Nova Scotia—</i>									
Annapolis.....	139	216	1,629 40	1	18	18	5	56 00	1,685 40
Antigonish.....	199	309	2,331 00						2,331 00
Cape Breton.....	513	920	6,861 00	40	599	15	143	1,684 60	8,545 60
Cumberland.....	3	3	23 70						23 70
Digby.....	361	639	4,770 10	10	146	14	32	389 20	5,159 30
Guysboro.....	629	1,000	7,529 00	23	281	12	80	889 00	8,418 00
Halifax.....	849	1,143	8,735 70	47	595	13	186	2,008 60	10,744 30
Inverness.....	212	465	3,420 50	3	34	10	14	140 40	3,560 90
Kings.....	76	93	717 70						717 70
Lunenburg.....	572	729	5,602 10	79	3,691	47	1,070	11,823 00	17,425 10
Pictou.....	21	34	255 60						255 60
Queens.....	163	258	1,948 20	17	234	12	67	743 20	2,691 40
Richmond.....	290	482	3,615 80	27	343	13	95	1,065 00	4,680 80
Shelburne.....	727	1,243	9,304 10	48	1,094	23	308	3,434 80	12,738 90
Victoria.....	298	456	3,444 40	13	177	13	51	564 60	4,009 00
Yarmouth.....	119	266	1,954 40	22	480	22	130	1,468 00	3,422 40
Totals.....	5,171	8,256	62,142 70	330	7,692	23	2,181	24,266 40	86,409 10
<i>New Brunswick—</i>									
Charlotte.....	162	293	2,183 70	1	11	11	3	33 80	2,217 50
Gloucester.....	450	868	6,489 20	148	2,613	17	553	6,815 80	13,305 00
Kent.....	185	320	2,393 00	9	96	11	25	286 00	2,679 00
Northumberland.....	2	5	36 50	7	75	10	14	181 40	217 90
Restigouche.....	6	10	75 00						75 00
Saint John.....	23	37	278 30						278 30
Westmoreland.....	31	68	500 20						500 20
Totals.....	859	1,601	11,955 90	165	2,795	17	595	7,317 00	19,272 90
<i>Prince Edward Island—</i>									
Kings.....	168	237	1,803 30	1	10	10	3	32 80	1,836 10
Prince.....	877	1,261	9,591 40	5	81	16	19	225 40	9,816 80
Queens.....	327	536	4,025 40	2	24	12	6	69 60	4,095 00
Totals.....	1,372	2,034	15,420 10	8	115	15	28	327 80	15,747 90
<i>Quebec—</i>									
Bonaventure.....	274	515	3,827 50	9	90	10	30	318 00	4,145 50
Gaspe.....	1,764	3,578	26,454 25	29	324	11	119	1,228 40	27,682 65
Matane.....	90	90	711 00						711 00
Saguenay.....	451	788	5,888 20						5,888 20
Totals.....	2,579	4,971	36,880 95	38	414	11	149	1,546 40	38,427 35
Grand Totals.....	9,981	16,862	126,399 65	541	11,016	20	2,953	33,457 60	159,857 25

NOTE.—A number of "Late" claims, amounting in all to \$2,984.20, which are included in this statement, were for the season of 1936. As the basis of distribution for 1936 differed from that of 1937, a number of the figures shown in the "Amount" columns do not, as a result, balance with the number of claims paid.

INSPECTION OF PLANTS AND PRODUCTS

Inspection of fish curing plants, canneries, certain classes of fisheries products, and the containers used in marketing some of those products is carried on under authority of the Fish Inspection Act and the Meat and Canned Foods Act. A report relative to inspection work generally during the past year will be found in Appendix No. 4, while Appendix No. 5 deals with canned salmon inspection by itself, and in a good deal of detail. It is not necessary to make extended reference here to the contents of these appendices, although it may be noted that the facts which they give are indicative of the great extension of fisheries inspection services which has been brought about in a comparatively short term of years.

Perhaps, however, attention might well be drawn to the results of canned salmon inspection during 1937. Salmon inspection is carried on by the staff of the Canned Salmon Inspection Laboratory which the department operates at Vancouver and under regulations made under the Meat and Canned Foods Act no canned salmon packed in British Columbia, where practically all of Canada's output of this product is put up, may be shipped to market until it has been inspected. In 1937, as will be seen from a table which is printed on page 61 (the table itself does not appear in Appendix No. 5) slightly more than 1,635,700 cases of canned salmon were inspected by the laboratory chemists and of this number there were less than 30,000 cases which were not found eligible for certification as fresh, firm, well packed and in good merchantable condition. In other words, about 98.5 per cent of the salmon passed inspection as being up to the standard required for certification. That is clear testimony to the quality standards maintained by British Columbia salmon canners. The testimony becomes still more striking when the particulars regarding those cases which did not receive certificates of approval are examined. Out of the 29,950½ cases which were not certified 26,504½ measured up to Grade B standard, which means that while not up to certificate requirements they were sound, wholesome and fit for human food and 3,438 cases contained tips and tails, which under the regulations, may never be given certificates. Only eight cases were below Grade B standard and, therefore, condemned!

EDUCATIONAL WORK AND RESEARCH

Educational work carried on among fishermen during 1937 is outlined, in part, in Appendix No. 4 of this report. The work included instruction in pickle-curing and the processing of dried fish according to what is known as the "Gaspé cure" and, on the Pacific Coast, the presentation of a series of lectures to fishermen on a number of subjects of direct importance to them in their calling. Details of this part of the department's work for the year need not be summarized here but perhaps it may be pointed out that the plan which has been followed in recent years of sending expert instructors in pickle-curing to different Atlantic Coast fishing communities has proven especially useful. As Appendix No. 4 puts it, this particular instructional service has improved "the quality of codfish prepared for conversion into boneless fish, with the result that the demand for the product by those who cut fish into boneless in Canada, as well as the United States, has greatly increased, thus relieving the very congested conditions in the dried fish markets."

It was not found possible in 1937 to hold courses of instruction such as have been given for fishermen and fisheries officers at stations of the Fisheries Research Board in other recent years. Arrangements were made, however, to hold two courses in the spring of 1938—one at the Halifax station of the board and the other at the station at Grand river, Quebec.

An important part of the year's educational program was the work carried on in certain New Brunswick areas and the Magdalen Islands by specialists in adult education sent into these districts under arrangements made by the department. The specialists were from the Extension Department staff at St. Francis Xavier University and the charge against the Fisheries Department for their work was only the actual cost involved. The purpose of this particular educational service, which will be continued during the coming fiscal year, is to assist the fishermen, in areas where this particular work is made desirable by special conditions, to equip themselves to grapple effectively with their own problems by means of organized effort. The work was begun in northeastern New Brunswick in 1936-37 and during 1937-38 it was continued there and extended to the Magdalen Islands. In the two districts something like 600 study clubs, with an average membership of ten, were functioning during the

past year. As an outcome of the work of the instructors since the program was initiated some twenty groups of fishermen have been organized into associations affiliated with the United Maritime Fishermen, a body representative of the commercial fishermen in different parts of the Maritime Provinces and the Magdalens. Many of these groups are carrying on co-operative activities, such as co-operative canning and marketing of lobsters and the marketing of smelts. In addition to forming associations for co-operative action and other purposes, the fishermen in a number of communities have also established credit unions, a dozen or more in all.

During the year the Fisheries Research Board continued a program of research in connection with numerous problems related to the fisheries. Five research stations or centres, and several sub-stations, were in operation. While the Research Board operates under the control of the Minister of Fisheries, and is, in effect, the scientific division of the department, it has its own organization and issues its own annual report and other publications. A review of the board's work for the past year will be found in its annual report.

FISH CULTURE

Fish cultural work was carried on by the department in 1937 in Nova Scotia, New Brunswick and Prince Edward Island, in the east, and in British Columbia, in the west, where administration of the fisheries is a federal function. Operations were concerned with the more important fresh water and anadromous food and game fishes such as Atlantic, ouananiche and sebago salmon and speckled, rainbow, Kamloops, and salmon trout in the east, and with sockeye, coho and Kennerly's salmon, and steelhead, Kamloops, speckled and cutthroat trout in the west. The operation of the hatcheries located in the National Parks in Alberta was directed by the Department of Fisheries but at the expense of the National Parks Bureau of the Lands, Parks and Forests Branch, Department of Mines and Resources, up to March 31, 1937, but the hatcheries were then turned over completely to the National Parks Bureau.

During 1937 there were in operation sixteen main hatcheries, seven subsidiary hatcheries, three rearing stations, eight salmon-retaining ponds and several egg-collecting stations. The total output for the year was 61,831,780.

A detailed report on fish culture operations during the past year is to be found in Appendix No. 2 of this paper.

OYSTER FARMING DEVELOPMENT

Perhaps one of the most interesting parts of this report is Appendix No. 3, which deals with the growth and success of the department's oyster culture program in Prince Edward Island and the start which has been made toward carrying out a similar program in Nova Scotia. It is only in these two provinces, and on a small piece of the New Brunswick coast, that control of the oyster areas is in the hands of the department. In New Brunswick, with the exception noted, and in the fourth oyster producing province, British Columbia, the areas are under the jurisdiction of the respective provincial governments.

In Prince Edward Island the control of the oyster areas was transferred by the province to federal authority in 1928 and, following two or three years of necessary investigations and experiments, very substantial progress has been made by the department in developing a commercial oyster farming industry in the island. In 1936 the government at Halifax transferred Nova Scotia's oyster areas to Dominion control and by February, 1938, the department was in a position to invite applications for leases of ground by persons wishing to undertake oyster farming in the province. It will be noticed at once that in Nova Scotia less time elapsed between the signing of the federal-provincial transfer

agreement and the offer of areas for leasing than had elapsed in Prince Edward Island. There were two main reasons for this state of affairs. In endeavouring to establish oyster farming in the island province the department was undertaking an enterprise that was entirely new to Canada and the thorough study of the whole situation which was necessary required considerable time. When action came to be taken in Nova Scotia the department had at its command all the knowledge gained from its research in Prince Edward Island and from the experience of the island's oyster farmers. Knowledge as to oyster culture gained in one province or district is not necessarily applicable in all its details to oyster farming problems elsewhere—indeed, there may be quite pronounced differences in problems—but a good deal of the knowledge derived from the Prince Edward Island work could be applied in planning the Nova Scotia program. The second factor helping to make it possible to offer Nova Scotia grounds for leasing within a comparatively short time of the transfer of the areas to Dominion control was that, prior to the signing of the 1936 agreement, the department had carried on some preliminary investigations in the province at the request of the provincial authorities.

It will be seen from the Nova Scotia section of Appendix 3 that Dr. A. W. H. Needler, the scientist who is in charge of Atlantic coast oyster culture work, is of the opinion that "a greatly increased production of oysters of good shape would be possible (in Nova Scotia) with proper methods." What has been accomplished in Prince Edward Island encourages the belief that success will also be achieved in Nova Scotia. A glance at some of the tables in the appendix will show that the Prince Edward Island farming program has gone ahead very fast. For instance, in 1932, the year following the opening of areas for leasing, there were in operation only 26 "farms," with a total acreage of approximately 110 acres. They doubled in number and acreage, with something to spare in both cases, in 1933. Increase has continued steadily and by 1937 there were 463 farms under cultivation and they covered about 1,690 acres. In 1932 no oysters were sold from the farms, but in 1937 nearly 1,950 barrels were marketed. Moreover, it is noteworthy, having regard to production possibilities of the future, that the lessees have been greatly increasing the quantities of oysters they have been planting on their areas. They are building up their stock so that a few years hence they may have much larger quantities of marketable oysters available for shipment. In 1932 they planted only 254 barrels, in the next year more than five times that number, and during 1937 no less than 5,175 barrels.

RETURNS FROM PELAGIC SEALING

Canada's share of the fur sealskins taken on the Pribilof Island rookeries in 1937 under the Pelagic Sealing Treaty of 1911 was made up of 8,277 skins, which were delivered to the Canadian authorities by the United States Government. In the preceding year, the Canadian share of the take was 7,867 skins. Under the treaty, all hunting of the fur seals at the Pribilof Islands is in the hands of the United States Government, but the Dominion is entitled to 15 per cent, in number and value, of the annual take. At the time when the treaty became effective the seal herds had been reduced to less than 150,000 animals but the measure of protection which has been given them as a result of the treaty has brought the number up to more than 1,800,000 and Canada has shared in the benefit.

For several years past, Canada has been selling its share of the skins in London. Previously, the Dominion did not market the skins itself but received from the United States Government each year 15 per cent of the net proceeds from the sale of pelts. The plan of offering the skins on the London markets has had very satisfactory results but during the past year market conditions in the sealskin trade everywhere were generally less favourable than they had been

previously and the outcome of this state of affairs was that Canada's return from the sale of Pribilof skins in London was substantially less than half as great in the fiscal year 1937-38 as the receipts of the preceding year. There was a reduced demand for skins and prices were below the level for the earlier year. The combined result of these two factors was that the number of skins sold by Canada at the London fur auctions in 1937-38 was only 5,342, as compared with 5,887 in 1936-37, and the net receipts from the sales amounted to \$44,453.93, as against \$103,494.19. Market conditions were still unfavourable at the close of the fiscal year.

Under the Pelagic Sealing Treaty, Canada is also entitled to 10 per cent shares of the skins taken on Japanese and Russian rookeries. In the course of 1937-38 Canada received from Japan \$808.50, representing the proceeds from the sale of 201 skins.

EMPLOYMENT TREND IN BRITISH COLUMBIA

A noteworthy development in British Columbia's fishing industry in the past fifteen years or so has been the increasing measure in which fishing operations have come to be centred in the hands of white fishermen.

None but British subjects may obtain commercial fishing licences from the department but in recent years, contrary perhaps to some popular impressions, there has been substantial reduction in the percentage of Pacific coast licensees who are British subjects of Oriental origin and a corresponding rise in the percentage of white licensees. Numbers of native Indians are also among the licensees, of course, but while the percentage of Indian fishermen has fluctuated quite sharply from time to time there has been no marked trend either upwards or downwards in the past few years; such trend as has been evident has been slightly downward.

An extract or two from a table covering the number of commercial fishing licences issued annually in British Columbia since 1922 makes clear the increasing white predominance, although it is to be remembered, as already indicated, that all licensees, whatever their racial origins, are British subjects. Out of 7,541 licences granted in 1922 only 3,064, or 40.7 per cent, were issued to whites and 2,932, or 38.9 per cent, to persons of Oriental origin. Ten years later, 1932, when the scope of licensed operations had been extended somewhat for purposes of administrative control, the total number of licensees had increased to 10,973. Of this number, however, 57.3 per cent, or 6,288, were whites and only 2,070, or 18.9 per cent, were Orientals. By 1937 the licensees numbered 13,033, all told, but again the percentage of whites had increased and the percentage of Orientals had fallen still lower. Only 15.7 per cent of the licensees, or 2,049 out of 13,033, were Oriental in origin, as compared with 38.9 per cent in 1922. The percentage of white licensees in 1937 was 60.7 and of Indians 23.6.

Examination of licensee figures relating to particular fisheries, or branches of particular fisheries, tells the same story as the table covering the total number of fishing licences issued. Included in the data brought out by such an examination are the following facts, which are here given in summarized form:

Salmon Purse Seine Fishing.—Reckoning in numbers of fish taken, purse seine fishing normally produces something like 50 per cent of British Columbia's total annual catch of salmon (49 per cent in 1937) and none but whites and Indians are licensed as salmon purse seine fishermen.

Salmon Gill-net Fishing.—Only 955 fishermen of Oriental origin (44 of them returned soldiers) held salmon gill-net licences in 1937 as compared with 2,924 whites and 1,220 Indians. In 1922, on the other hand, the number of Oriental licensees, 1,989, exceeded the white fishermen by more than 500 and exceeded Indian licence holders by more than 900. Put in another way, between 1922 and 1937 the white licensees increased by about 100 per cent and Indian

licensees by 18 per cent but licence holders of Oriental origin decreased by 54 per cent. However, more Orientals than whites or Indians are employed as assistant operators of salmon gill-nets—528 in 1937 as against 272 Indians and 151 whites.

Salmon Trolling.—Out of 3,123 fishermen who were granted salmon trolling licences in 1937 about 95 per cent were white and Indians. The white licensees totalled 2,476, as against only 161 Orientals. In this case, too, there has been sharp reduction in the percentage of licensees outside the white and Indian groups.

Herring Purse Seining.—Three classes of licences are issued in connection with the herring seine fishery—licences for seines, licences for captains of herring seine boats, and licences for herring seine assistants. Except for the east coast of Vancouver Island, however, licences are issued to whites and Indians only.

In 1922 whites held 24 purse seine licences and Orientals held five; in 1937 the figures were whites, 40, Orientals, two.

Thirty-two captains' licences were granted in 1937 and of these 24 were held by whites, four by Indians and four by Orientals; in 1922 there were 19 Oriental licensees.

In the case of seine assistants 233 who were licensed in 1937 were whites and 80 were Indians or, together, 313 out of a total of 384.

Herring Gill-net Fishing.—Only a few herring gill-net fishing licences are taken out. The number of whites, 19, holding such licences was the same in 1937 as it had been fifteen years before but Oriental licensees had decreased from 19 to four. In other words, the latter group had decreased by nearly 80 per cent. There were no Indian licensees in either year.

Pilchard Fishing.—Licences in connection with pilchard fishing are issued to whites and Indians only. In 1937 the licensees numbered 259.

Halibut Fishing.—The halibut fishery ranks next in importance to the salmon fishery in British Columbia but halibut fishermen are not required to obtain licences. Authentic information shows, however, that while some 640 fishermen engaged in the fishery in 1937 not more than 25 of them were Orientals.

Minor Fisheries.—Fishermen engaging in certain of the minor fisheries of British Columbia are required to obtain licences. Between 1923 and 1937 the number of white and Indian licensees in the cod fishery increased from 109 to 329 and in the same period Oriental licence holders dropped from 404 to 152. In the crab fishery 147 whites and Indians were licenced in 1937, as compared with 93 in 1922; six Oriental fishermen held licences in the earlier year and one in 1937. Both in 1922 and in 1937 the Oriental fishermen obtaining licences to engage in fishing for grayfish, or dogfish, outnumbered the white and Indian licensees but a comparison of figures for the two years shows that the latter group have increased slightly and the others have decreased. Licences are required also by fishermen engaging in certain other fisheries such as those for shrimp, smelt and abalone. A comparison of licences granted in connection with this group of fisheries shows that in 1922 the Oriental licensees numbered 129 out of a total of 252 while in 1937 they totalled only 63 out of 197.

INTERNATIONAL FISHERIES COMMISSION

Under authority of the treaty of May 9, 1930, between Canada and the United States and the new supplanting treaty of January 29, 1937, the International Fisheries Commission continued the investigation of the life history of the Pacific halibut and the investigation and regulation of the Pacific halibut fishery. The investigations revealed that the condition of the stocks on the banks were continuing to improve under the commission's regulations.

The 1937 halibut treaty passed at the request of the fishing fleets, gave the commission additional regulatory powers. The additions authorized the commission to permit, regulate or prohibit the retention and landing of halibut caught incidental to fishing for other species of fish in any area, when halibut fishing is prohibited there, and the possession of halibut of any origin during such fishing. They also authorized the commission to stop the departure of vessels for an area when the number of vessels, which have already cleared, are sufficient to catch the limit set by the commission for that area. The new treaty did not become effective until August.

Canadian representation on the commission was changed during the year. Mr. George J. Alexander, Chairman of the commission and Assistant to the Commissioner of Fisheries for British Columbia, resigned and Mr. Lewis W. Patmore of Prince Rupert, was appointed to fill the vacancy. Mr. Edward W. Allen was elected Chairman to succeed Mr. Alexander. Mr. Patmore succeeded Mr. Allen as Secretary.

The commission maintained its usual close contact with the halibut industry. Informal meetings were held with various individuals and committees of fishermen. The annual meeting with the Conference Board, composed of representatives of the different sections of the fishing fleet, was held in Seattle on December 3. The meetings afforded opportunities of explaining the progress of the commission's investigations and the results achieved by regulation and of discussing the problems and difficulties encountered by the fishermen.

The 1937 halibut fishing season opened on March 16, as in the preceding year. Regulations governing fishing were essentially the same as in 1936 until August, after the closure of Areas 1 and 2, when new regulations were issued under the 1937 treaty.

CHANGES IN REGULATIONS

The regulations, issued August 11, were modified from the previous ones in several respects in accord with the provisions of the new treaty. They provided for the closure of Area 3 by prohibition of clearance for that area, when the boats already cleared for or fishing there were sufficient to catch the limit allowed, and by the setting of a subsequent date of last fishing. This permitted a full trip by these vessels, and eliminated motive, otherwise existing, for fishing after closure. The new regulations changed the date of termination of the closed season from midnight of March 15 to midnight of March 31 of each year. Other provisions relative to halibut fishing were essentially unchanged.

The catch limits in Areas 2 and 3 were attained and the areas were closed earlier than in 1936, in spite of the system of voluntary curtailment by the American fleet and the regulations under the Marketing Act in British Columbia for the Canadian fleet which proved generally effective in distributing the permitted catch over a longer season than would otherwise have been the case. Areas 1 and 2 were closed to halibut fishing at midnight, July 28, with catches of approximately 747,000 and 22,832,000 pounds, respectively. September 29 was set as the date of last clearance for halibut fishing in Area 3 and the area was closed to fishing at midnight, October 19 with a catch of approximately 25,556,000 pounds. No halibut were landed from Area 4, which was closed at the same time as Area 3.

Provision was made in the regulations issued August 11 for the retention and sale of a limited proportion of halibut caught incidentally to fishing for other species with set lines in areas closed to halibut fishing. This proved effective in reducing the amount of illegal fishing in Area 2 after closure. It prohibited the possession of halibut in a closed area without a permit, which was not good for fishing in an open area, and limited the amount of halibut which could be sold under such a permit to one pound of halibut for every seven pounds of other species, exclusive of salmon. The halibut landings by individual vessels under this provision were in general considerably less than the proportion legally

allowed. Total landings from this source were only 278,000 pounds but they assisted in providing additional income to the fishermen without damage to the stock of halibut and in stimulating the cod fishery.

The investigations of the scientific staff were continued where necessary for the fulfillment of the purposes of the treaty. They included the collection and analysis of the current biological and statistical data, which are necessary for the evaluation of the success of regulation and on which continued intelligent control of the fishery must be based. The collection of the biological data made vessel operations necessary.

IMPROVEMENT IN STOCKS

Further improvement in the condition of the stocks of halibut was revealed by the investigations. The abundance of fish, as indicated by the catch per unit of fishing effort, showed a further increase. The average catch per unit of gear in Area 3, which includes the grounds north and west of Cape Spencer, Alaska, reached 112 pounds during the year, an increase of about 19 per cent over the previous year and of 75 per cent since 1930, the year when the abundance of halibut reached its lowest ebb. The level of abundance in Area 3 is now similar to that which prevailed on the same grounds in 1923 and 1924.

The average catch per unit of gear fished in Area 2, which includes the grounds off the coast of British Columbia, was 61 pounds, an increase of 74 per cent from 1930. The catch per unit of effort was slightly below that of 1935 but above that of 1936 and shows a maintenance of the level previously reached. If the upward trend is continued it will be at a much reduced rate. The slowing down of the increase in abundance and the fluctuations from year to year in abundance justify the belief that the direct effect of the present degree of restriction is reaching its maximum. Additional but more gradual improvement may however take place through the delayed effect of restriction of fishing upon the production of young, which have not as yet had time to appear in any quantity in the commercial catch.

Observation of the effects of regulation upon the stock of halibut by means of market measurements was continued. A total of more than 96,000 halibut from 102 representative trips were measured at Seattle. Data were simultaneously taken for the study of the age and sex composition of the stocks. The reduction in the rate of capture of the fish resulting from regulation was reflected in a further small increase in the size of the fish landed, which in conjunction with the general increase in abundance proved a further small increase in the spawning stock on the grounds. It is noteworthy that the increase in spawning stock, particularly in Area 2, has been achieved without any progressive reduction in the total catch permitted the fleet.

MEASURE SPAWN PRODUCTION

Particular attention was devoted to the measurement of the production of spawn, the most practical and direct way of determining the changes in spawning conditions as soon as they occur. The halibut schooner *Eagle* was chartered and operated in Area 2, in the neighbourhood of Cape St. James, British Columbia, from December 4, 1936, to February 6, 1937. In addition to the standard net hauls, twenty-three quantitative net hauls were made and hydrographic material and data were collected at thirteen stations to ascertain more accurately the vertical distribution of the eggs in the water and the character of the water strata in which the eggs are found. The investigation of spawning in Area 2 was continued during the winter of 1937-38 when the same vessel was chartered and operated in the same locality from late December to early March.

The materials from 187 standard net hauls, taken at 80 stations during the winter of 1936-37, were sorted and analysed in the laboratory. They showed an increase in the abundance of spawn over the record of the previous winter.

Numerous factors, such as the accidental occurrence of favourable hydrographic conditions for spawning and survival of the young, or the presence of unusual conditions of the ocean currents tending to concentrate the eggs in the vicinity of the spawning banks rather than to scatter them along the coast, may cause sudden changes in the amount of spawn found in any area. Only an increase in the number of eggs taken in the nets over a series of years may be interpreted as positive proof of an increase in spawn within a region. The numbers taken in Area 2 during the past four years have more or less steadily increased, and are reasonable proof of an actual increase in the number of spawners there.

Four publications were issued during the year. These consisted of one report, No. 12, and three circulars, Nos. 5, 6, and 7. The report was *Theory of the Effect of Fishing on the Stock of Halibut*, by W. F. Thompson. It dealt with the theory which explains the effect of the present regulations and was written after the author's careful study of the changes in the fisheries of other regions, particularly those of the North sea. There is every reason to believe that the theory found practical in the case of the halibut, applies also to other fisheries. The three circulars were respectively: *Why are there Separate Areas?* by H. A. Dunlop; *Halibut Tagging Experiments*, by John Laurence Kask; and *The Early Life History of the Halibut*, by Richard Van Cleve. They were written with a view to explaining in simple form the results of the investigations of the commission and their bearing on the regulation of the fishery.

The commission's investigations continued to explain the changes taking place in the stocks of halibut on the banks. They proved that the condition of the stocks is still improving as a result of regulation and offered new assurance of the ultimate success of the commission in rebuilding the stocks of halibut to a higher level of productiveness.

NORTH AMERICAN COUNCIL ON FISHERY INVESTIGATIONS

The North American Council correlates the principal fishery investigations of international importance in the western part of the North Atlantic and maintains contact with the somewhat similar European body, the International Council for the Exploration of the Sea, which correlates investigations on the eastern side of the North Atlantic.

The twenty-fourth meeting of the North American Council was held at Montreal on September 23, 24 and 25, 1937. Newfoundland was represented by Dr. N. L. Macpherson, Acting Director of the Fishery Research Laboratory; the chairman of the Council, Dr. H. B. Bigelow, Director of the Woods Hole Oceanographic Institution, and Mr. Elmer Higgins, Chief of the Division of Scientific Enquiry of the Bureau of Fisheries, represented the United States; and for Canada, the three members, Dr. W. A. Found, Deputy Minister of Fisheries, Professor J. P. McMurrich of the Biological Board, and Dr. A. G. Huntsman, Consulting Director of the Biological Board, were present. There were present in addition four advisers from the United States and four from Canada, as well as two guests, Dr. Georges Préfontaine, of the University of Montreal, and Dr. D. L. Belding, of Boston University Medical School, both being members of the recently appointed Quebec Salmon Commission.

The subject of fluctuations in the abundance of fishes was under consideration, the preliminary phase being completed of a study of the abundance of particular year classes of cod, haddock, herring, mackerel and salmon. This has been in co-operation with the European International Council, with the common object of discovering any coincidences there might be in the occurrence of similar fluctuations on both sides of the Atlantic, which might point to the operation of a common cause. The North American Council itself has been attempting to discover and put on record all possible causes of variations in abundance of important fishes such as those mentioned, and already has a considerable number listed.

The results of *salmon investigations* figured prominently at the meeting. Canada has for several years been doing intensive work in the Margaree district of Cape Breton island, and the principal result reported was of an experiment in eliminating fish-eating birds from a salmon stream in order to increase the numbers of salmon smolt that would go to sea. A comparative survey showed that, with elimination of the birds, there were strikingly larger numbers of young salmon and trout. The study of the movements of the unspawned salmon, as taken by nets in the sea, that had been carried on for two years by tagging salmon on the Margaree coast, was greatly extended in 1937 by operations under the Quebec Salmon Commission, largely with funds furnished by angling interests of northern New Brunswick and Quebec, and through the co-operation of the Newfoundland Fishery Research Board. Approximately 1,690 salmon were tagged on the north side of Cabot strait and at various points around the gulf of St. Lawrence. The salmon of Cabot strait and off Seven islands in the St. Lawrence estuary scattered widely, those of St. Augustine and St. Paul rivers near the strait of Belle Isle remained in or near the estuaries of those rivers, and those of the Margaree coast, the Miramichi drift area, and cape Gaspé spread out coastwise in both directions. The movements shown are far from being simple, since there were such unexpected directions taken as¹ from Cabot strait eastwards along the south coast of Newfoundland and also through Belle Isle strait to the outer coast of Labrador,² from Seven islands to Anticosti and to the Restigouche river, and³ from the Margaree coast out through Cabot strait and out through the gut of Canso.

The *haddock investigations*, conducted chiefly by the United States, show that the haddock populations on the banks off Nova Scotia and on Georges bank are fluctuating independently with corresponding differences in the fishery. Off Nova Scotia no year classes since that of 1929 have been sufficiently numerous to balance the drain due to natural mortality and the fishery combined, with the result that since 1935 the catch per day has been falling steadily. On Georges bank, however, improvement in the fishing has proved to be the result of fair to good numbers of haddock in the year classes 1931, 1932 and 1933, with a scarce 1934 year class causing a decline in the fall of 1936 and the spring of 1937. The fishery is thus seen to fluctuate with the abundance of the haddock from the spawnings of the various years. A similar situation has been demonstrated for the mackerel, but for neither of these fishes is there as yet any explanation of the abundance or scarcity of particular year classes.

The *movements of cod* have been studied principally by Canada. A total of 1,108 of these fish were tagged in 1936, and 5,041 in 1937, on the outer Nova Scotian coast, on the outer banks off Nova Scotia, and in the gulf of St. Lawrence. About eight times as large a proportion of the shore fish are recaptured as of those of the outer banks. Most of the shore fish remain near the point of tagging, but from the outer banks there is a decided movement to and into the gulf of St. Lawrence along the edge of deep water, even as far as Gaspé, and there is some movement to the Newfoundland coast and the Grand banks.

The *temperature of the water* continues to be found of great importance for the fisheries, since it shows in certain regions marked differences from year to year for the same season, which contrasts with the rather regular alteration of winter and summer in such a region as the bay of Fundy. While winter temperatures sometimes prevail through summer in part of the water outside Nova Scotia, in 1937 the conditions were those of a warm year up to July, but colder waters moved in by August. With these and other facts before it, the council has recommended "that the United States, Canada, and Newfoundland consider means of collecting frequent temperature observations on the fishing grounds and also the advisability of reporting to the fishing fleet from time to time concerning the general temperature trends in important areas."

ESTABLISHMENT OF PACIFIC SALMON COMMISSION

Following exchange of ratification in July, 1937, of the convention signed by Canada and the United States in 1930 for the protection, preservation and extension of the sockeye salmon fisheries of the Fraser River system the two nations established the International Pacific Salmon Fisheries Commission which, under the convention's terms, is to carry out a thorough investigation into the natural history of the Fraser River sockeye and into hatchery methods and spawning ground conditions, and is to undertake related work. The commission held its organization meeting at Vancouver in the autumn of 1937 and, following a meeting at Ottawa in January, 1938, its program of investigations was begun. New Westminster, B.C., has been selected as commission headquarters. The commissioners representing the United States are Charles E. Jackson, Deputy Commissioner, federal Bureau of Fisheries, Washington, D.C., B. M. Brennan, Director of Fisheries for the State of Washington, and Edward W. Allen, of Seattle, Wash. Canada is represented by A. L. Hager, Vancouver; Tom Reid, New Westminster, and the undersigned. The commissioners selected Mr. Hager as chairman of the commission and Mr. Brennan as the secretary. They have also named Dr. W. F. Thompson, an outstanding fisheries research scientist, as director of investigations.

Approval of the convention was qualified by three conditions. One of these conditions was that the commission shall have no power to authorize any type of fishing gear contrary to the laws of the State of Washington or the laws of the Dominion. The second was that the commission "shall not promulgate or enforce regulations until the scientific investigations provided for in the convention have been made covering two cycles of sockeye salmon runs, or eight years." Under the third condition the commission was required to set up an advisory committee representative of various salmon interests in the United States and Canada, and this committee has already been created.

Members of the advisory committee, appointed by the commission, are as follows: Representatives of purse seine fishermen—M. E. Guest, Vancouver, and Lee Makovich, Everett, Wash.; representatives of gill net fishermen—F. Rolley, Whonnock, B.C., and Chester Karlson, LaConner, Wash.; representatives of troll fishermen—W. G. Hawley, Ucluelet, B.C., and Sevrin Leite, Seattle; representatives of sport fishermen—M. W. Black, New Westminster, and Ken McLeod, Seattle; representatives of the canning branch of the salmon industry—Richard Nelson, Vancouver, and C. J. Collins, Seattle. Under the convention condition the committee's members "shall be invited to all non-executive meetings of the commission and shall be given full opportunity to examine and be heard on all proposed orders, regulations or recommendations."

An honorary scientific advisory council, with whose members the program of investigations and the results obtained can be discussed from time to time, is also being appointed by the commission. This council will be composed of three Canadian fisheries biologists of recognized standing and three from the United States. Dr. A. T. Cameron, chairman of the federal Fisheries Research Board, Dr. W. A. Clemens, director of the Research Board's biological station at Nanaimo, B.C., and Dr. A. H. Hutchinson, of the staff of the University of British Columbia, are the appointees from Canada. The United States scientists named to the council are Dr. F. A. Davidson, of the United States Bureau of Fisheries staff at Seattle, Dr. John E. Guberlet, professor of zoology at the University of Washington, Seattle, and Dr. L. A. Royal, of the Washington State Department of Fisheries.

WM. A. FOUND,

Deputy Minister of Fisheries.

APPENDIX No. 1

ANNUAL REPORTS OF CHIEF SUPERVISORS OF FISHERIES
FOR THE YEAR 1937REPORT OF MAJOR D. H. SUTHERLAND, CHIEF SUPERVISOR
OF FISHERIES, EASTERN DIVISION

While the production of all fish landed in the division was less by over 16,000,000 pounds than the quantity taken in 1936, values were well maintained with the result that the total value to the fishermen was approximately \$300,000 greater and the marketed value of all products almost 300,000 dollars more than those received during the previous year. The net decrease in production was due to smaller landings in New Brunswick and the Magdalen Islands, the catches in Nova Scotia and Prince Edward Island increasing by about eight million pounds. In the division as a whole there were increases in the quantity of lobsters, mackerel, halibut, scallops, oysters, hake and pollock among fourteen chief varieties entering into the catch and decreases in cod, haddock, herring, smelts, salmon, sardines and swordfish.

The total production was 455,537,100 pounds with a landed value of \$8,911,331, compared with 472,371,100 pounds valued to the fishermen at \$8,610,211 in 1936.

Important factors in changing production totals for the year were an increase of over eleven million pounds in the catch of pollock and decreases of 17,505,200 pounds in the sardine and 12,000,000 pounds in the herring landings.

The total marketed values and approximate quantities of all varieties of fish and shellfish landed throughout the division during each of the past six years have been as follows:—

—	Production	Marketed Value
	lb.	\$
1937.....	455,000,000	14,945,696
1936.....	472,000,000	14,764,797
1935.....	419,000,000	13,081,989
1934.....	422,000,000	12,786,565
1933.....	390,000,000	10,205,397
1932.....	346,000,000	10,914,282

THE LOBSTER FISHERY

It is encouraging to notice a slight increase in the catch of lobsters, which decreased steadily from 1932-1936, notwithstanding most intensive fishing. The improved catches, however, were not general, being confined mostly to the western district of Nova Scotia, where a minimum size limit has been applied since 1933, and to the eastern district of New Brunswick. In the latter area there was also a slight increase during the 1936 seasons, but changed regulations there placed more of the coast in the fall fishing season during 1937 and the catch during that period was considerably heavier than it had been when the spring season existed there. Whether or not this indicates that the fishery has regained ground on this section of the coast will not be determined until the results of the next few seasons are known.

The total lobster catch for the division was 30,708,900 pounds, valued to the fishermen at \$3,719,234, as compared with 28,057,200 pounds with a landed value of \$3,425,620 in 1936.

The number of fishermen engaged in this fishery was 18,834, or about 283 more than in the previous year.

The recent trend in the lobster fishery, which is the most important branch of the fisheries in the east, is indicated by the following table:—

	Fishermen Licensed	Pounds
1937.....	18,832	30,708,900
1936.....	18,551	28,057,200
1935.....	18,146	31,725,000
1934.....	17,968	35,658,800
1933.....	17,348	37,012,100
1932.....	15,703	47,852,100

In Nova Scotia in 1937 there was a catch increase of 1,387,000 pounds, which, as already stated, was due to improved fishing in the western district, but the prices offered for market lobsters in that area were much lower than average, especially during the December season. In the eastern districts of the province the total catch was about the same as in 1936 and due to keen competition among the buyers prices were above the average and the landed value thus increased.

The New Brunswick catch increased by 1,608,700 pounds. Larger catches were taken on both coasts, but the eastern section accounts for over 95 per cent of the increase. Values were also greater, but, due to a lower price range, were not increased in proportion to the increase in production.

Both on Prince Edward Island and the Magdalen Islands the catch showed a further decline, due to no other apparent reason than scarcity of lobsters. The catch was less on Prince Edward Island by 104,800 pounds and on the Magdalen Islands by 239,200 pounds. The average size of lobsters taken in these areas, but particularly along the north shore of Prince Edward Island, was noticeably smaller than previously.

In the division 238 lobster canneries operated in 1937. Their pack was 88,181 cases of 48 pounds each, compared with 87,390 cases during the previous year. Shell shipments increased considerably, due to heavier production in the size limit areas and a larger catch during the late fishing season in the Gulf district.

(A table showing lobster catch, pack, shell and lobster meat shipments for the past four years is printed on page 9 of this paper.)

THE COD FISHERY

As a result of reduction in landings in Cape Breton, northeastern New Brunswick and the Magdalen Islands, the total catch of codfish in the division during the year was about 1,500,000 pounds less than in 1936, but it should be noted that the catch of that year was more than 14,000,000 pounds greater than that of 1935 and the largest since 1929. On the mainland of Nova Scotia the cod catch increased by about 5,000,000 pounds, which is accounted for by larger catches of the Lunenburg fleet while engaged in salt bank fishing and heavier landings for the fresh fish industry at Halifax. The production of codfish from inshore fishing, on which the bulk of the shore fishing population depends, was unsatisfactory. This is well demonstrated by the heavy decrease in the catch in the areas above mentioned.

The total quantity of codfish taken during the year was 131,647,500 pounds, compared with 133,158,400 pounds in 1936, with landed values of \$1,739,459 and \$1,617,198 respectively, and marketed values of \$2,719,585 and \$2,699,298.

THE SARDINE FISHERY

The sardine fishery, by far the most important of the Bay of Fundy fisheries and in fact entirely confined to the New Brunswick coast waters of that area, is the third most valuable in eastern Canada. The 1937 catch fell off by 17,505,200 pounds and by \$71,590 in value to the fishermen, but marketed values were well maintained, the pack of 423,043 cases being the highest in record.

The production of sardines and the quantity canned in the past six years have been as follows:—

	Catch	Quantity canned
	lbs.	Cases of 25 lbs.
1937.....	31,768,400	423,043
1936.....	49,273,600	393,854
1935.....	37,499,800	338,436
1934.....	38,231,000	288,091
1933.....	26,022,400	180,597
1932.....	13,337,800	113,197

THE HADDOCK FISHERY

The haddock fishery is the fifth most valuable in this division, but the 1937 production fell off by over two and one-quarter million pounds, due to reduced landings in Halifax and Guysboro counties. The decrease would have been much greater had it not been for a very large catch of spring haddock at Ingonish on the northeast coast of Cape Breton Island where over 5,500,000 pounds were taken in trap nets.

In New Brunswick the fishery is confined to Charlotte and Saint John counties and the catch there was almost a complete failure.

The total quantity of haddock landed in the division was 38,806,800 pounds, as compared with 40,041,400 pounds in 1936. It had a landed value of \$635,949 and marketed value of \$1,294,091, compared with corresponding values of \$663,641 and \$1,287,308 in 1936.

THE SMELT FISHERY

On the east coast of New Brunswick, which produces the bulk of the smelts and where the catch increased in 1936 by over 1,000,000 pounds, the landings were less during the 1937 season by 2,115,500 pounds. This drop, together with slight decreases in eastern Nova Scotia and Prince Edward Island, brought about a decrease in the division of 2,493,800 pounds. Prices offered for frozen smelts in the ice at New Brunswick were the lowest for some years.

The total smelt catch for the division was 5,871,500 pounds, landed value was \$280,406 and marketed value \$394,326. Comparative figures for 1936 were 8,365,300 pounds, \$388,414 and \$599,270 respectively.

THE HERRING FISHERY

In every district of the division the herring fishery fell off, excepting in the eastern mainland portion of Nova Scotia and on Prince Edward Island. The total decrease was 12,082,200 pounds, over half of it in New Brunswick. In Charlotte county, particularly Grand Manan, where herring are used principally

for smoking, the catch declined about 6,000,000 pounds, due largely to a light run of fish. This, however, permitted the old stocks that were carried over to be cleaned up and a heavy catch would have been detrimental to the smoking industry. On the east coast of New Brunswick, where spring herring are used largely for bait and fertilizer, the smaller catch does not represent scarcity of fish as much as lack of fishing effort.

In Nova Scotia there was a generally smaller catch in the eastern and western sections, while in the central district the catch increased by one and one-half million pounds as a result of bait demand.

The total divisional catch was 81,974,600 pounds, valued to the fishermen at \$336,687, and in marketed valued at \$953,514, compared with 94,056,800 pounds and values of \$367,974 and \$1,009,337, respectively, in the preceding year.

THE MACKEREL FISHERY

Due to increased production in the Magdalen Islands and western Nova Scotia the mackerel catch increased by over 1,000,000 pounds, but the quantities taken in eastern Nova Scotia decreased by over 2,000,000 pounds. The Cape Breton section, which was largely responsible for a big increase in 1936, fell off sharply in 1937 production, excepting Inverness county, where heavy landings of fall fish were taken and sold at satisfactory prices. The New Brunswick and Prince Edward Island catches were about the same as in the previous year.

The total quantity of mackerel taken was 23,639,300 pounds, compared with 22,592,900 pounds in 1936. The landed and marketed values increased by \$112,022 and \$172,026 respectively.

THE SALMON FISHERY

Commercial salmon catch for the division was 2,029,400 pounds, valued as landed at \$284,233 and, as marketed, at \$330,216, compared with 2,261,400 pounds, with values \$283,453 and \$341,577 in 1936. Decrease in catches was general throughout the division, but in the eastern district of New Brunswick, the heaviest producer, there was a decrease of 110,600 pounds, due to unfavourable fishing conditions in the trap net fishery of baie de Chaleur. The drift net fishery of the Miramichi showed an increase in catch and also in value. Results on the Bay of Fundy coast of New Brunswick were about the same as in the previous year, while in Nova Scotia the catch dropped off in all districts.

THE HALIBUT FISHERY

Halibut fishing on the Atlantic coast is almost entirely confined to Nova Scotia and the quantity of 3,130,100 pounds taken there in 1937 was mostly landed at Lunenburg and Lockeport and Halifax. The catch and values were about the same as for 1936.

THE SCALLOP FISHERY

Scallop fishermen landed 183,695 gallons (shelled), which represents 91,848 barrels in the shell. Of the total catch 180,855 gallons were taken in Nova Scotia, where the main fishery is centralized at Digby. The New Brunswick catch, Charlotte county, made up the balance of 2,840 gallons, but this was a decline from 7,298 gallons taken there in 1936 and 6,734 gallons in 1935.

The Digby fishery continued to expand in production, but declined in value, owing to less favourable markets. In fact, the returns may times during the fall and winter season were less than operating cost, so that the vessels engaged in the fishery were working at a loss. The catch of scallops at Digby has been absorbed by the Boston market since this fishery was developed in 1920 and little effort has been made to find other outlets or to regulate the supply going to Boston. The unusually low price range during the past season

has been keenly felt by the producers and little improvement is looked for until the industry is placed on a sound economic footing.

While the 1937 catch was greater by 13,085 gallons than 1936 output, the landed value was less by \$33,867 and the marketed value less by \$37,607.

OTHER FISHERIES

One of the important results of the year's operations was the tremendous increase in the production of pollock of 11,250,000 pounds. It was due to a phenomenal run of these fish during the summer months in the Bay of Fundy, both on the New Brunswick and Nova Scotia coasts. The catch of 13,336,000 pounds in New Brunswick and 10,648,500 pounds in Nova Scotia establishes a record. Total landed value was \$99,122 and the marketed value \$222,208; the 1936 figures were \$57,679 and \$114,200.

The oyster fishery, which is prosecuted in eastern New Brunswick, Prince Edward Island, Cape Breton and the northern portion of Nova Scotia, produced 4,471,000 pounds (22,355 barrels), compared with 4,154,000 pounds (20,770 barrels) in 1936. The Nova Scotia production declined by 588 barrels and Prince Edward Island yield decreased by 264 barrels. In New Brunswick the catch increased 2,437 barrels. Landed and marketed values of \$102,552 and \$143,880 represent increases of \$8,805 and \$13,645 respectively.

In the Cape Breton areas there were evident signs of scarcity of oysters, due to depletion on the public areas, and this is also true of the beds along the Northumberland Strait section of Nova Scotia. Under a planned program of development that is now being inaugurated it is expected that oyster farming will be encouraged in these areas.

In New Brunswick the production of oysters has increased considerably during the past three years. The public beds there are located at Caraquet, Miramichi bay, Richibucto, Buctouche, Cocagne and Shediac and the quality of the oysters marketed from these beds has greatly improved, as a result of careful inspection.

The Prince Edward Island areas in Prince and south Queens showed increased production, due in part to the quantities marketed from oyster farms in east Prince which are developing rapidly. In the East river areas of Queens county there has been very heavy mortality and the public beds there have been largely depleted, as will be indicated by a catch of 137 barrels, compared with 2,565 barrels in 1936 and as high as 6,000 barrels a few years ago.

The catch of swordfish was 1,502,000 pounds, compared with 1,785,300 pounds in 1936 and 2,233,900 pounds in 1935, which was the peak year. As usual, the bulk of the catch was produced off the Cape Breton coast, where the catch declined 252,400 pounds, owing to unfavourable weather and scarcity of fish near the coast. Prices, however, were much higher than during the previous year, with the result that both landed and marketed values for the division showed gain. In the eastern mainland division of Nova Scotia, where a heavy catch of 401,200 pounds of early fish was taken in 1936, the landings fell to 54,700 pounds as the fish did not appear on the coast. Unexpected quantities, however, were taken in the western district and over 400,000 pounds were landed in Yarmouth as compared with only 100,000 pounds in the previous year.

NOVA SCOTIA

Production of all varieties of fish in Nova Scotia during 1937 totalled 270,307,800 pounds, or about 5,000,000 pounds more than the landings for 1936, which had been the greatest since 1929. Returns to the fishermen increased by about half a million dollars and the marketed value by more than \$200,000.

In the western district of the province total landings increased by 9,000,000 pounds, while the eastern mainland portion produced about the same quantity

as in 1936. In Cape Breton Island, however, due to the failure of the shore cod fishery and smaller catches of mackerel, herring and swordfish, the total catch fell off about 3,500,000 pounds.

Noticeable increases were:

Lobsters.. . . .	1,387,000 pounds
Cod.. . . .	1,463,700 "
Scallops.. . . .	17,550 gallons (shelled, equivalent to 8,775 barrels)
Pollock.. . . .	3,127,500 pounds

The pollock increase was due to exceptionally heavy catches in Digby county. The haddock catch declined by about 680,100 pounds, following smaller landings in the eastern mainland district, and, as previously indicated, decrease for the province would have been decidedly greater had it not been for the spring fishery at Ingonish which showed an increase of 2,478,800 pounds. The mackerel catch decreased by 1,458,400 pounds, as a result of small spring catches in Halifax and Guysboro counties and on the eastern Cape Breton coast, but both landed and marketed values are substantially greater. There was a keen demand for salt mackerel when the season opened, as the old stocks had been cleaned up, and the price range was higher than the average until September. A splendid run of fall mackerel appeared on the Inverness and Eastern Guysboro coast for which the fishermen received prices running to three cents per pound; most of these fish were cured as salt mackerel fillets. Herring fishing, in Yarmouth county particularly, where the fish did not come inshore during July, was not successful. The total catch for the province showed a drop of 2,549,000 pounds. Salmon returns fell off in all districts with a total decrease of 137,200 pounds and there was also a decline in the catches of smelts and oysters.

For the first time since 1932 there was an increased production of lobsters, but this does not indicate any general improvement in the fishery, as the increase was confined to the western district, where a minimum size limit is applied. The increase in catch amounted to 1,387,000 pounds. Of this gain the western district was responsible for 1,371,300 pounds, the eastern mainland district 82,400 pounds, but the Cape Breton Island catch decreased by 66,900 pounds. Annual catches for the province since 1932 have been as follows:

1937.. . . .	15,896,100 pounds
1936.. . . .	14,509,100 "
1935.. . . .	17,683,600 "
1934.. . . .	18,459,000 "
1933.. . . .	17,685,800 "
1932.. . . .	23,773,000 "

The total catches with landed and marketed values and similar information covering the chief varieties taken by Nova Scotia fishermen will be found in the following tables:

1937	
Total quantity of all fish landed, lbs.. . . .	\$270,307,800
Landed value.. . . .	6,015,186
Marketed value.. . . .	9,229,834

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	15,896,100	2,304,302	2,757,880
Cod.....	109,396,500	1,526,374	2,404,452
Haddock.....	38,504,700	628,606	1,282,023
Mackerel.....	17,603,200	302,723	465,803
Halibut.....	3,130,100	290,222	392,335
Scallops (shelled) gals.....	180,855	274,760	291,225
Swordfish.....	1,502,000	170,198	238,165
Herring.....	20,121,400	129,522	342,426
Hake and cusk.....	14,428,900	74,843	210,653
Salmon.....	464,700	70,304	79,389
Pollock.....	10,648,500	53,874	102,005
Smelts.....	687,200	40,246	56,842
Oysters.....	866,200	18,873	24,373
Flounders.....	1,044,500	10,445	37,682

1936

Total quantity of all fish landed, lbs.....	265,092,200
Landed value.....	\$ 5,491,552
Marketed value.....	\$ 8,905,268

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	14,509,100	1,992,170	2,570,274
Cod.....	107,932,800	1,398,509	2,341,724
Haddock.....	39,184,800	642,838	1,263,161
Mackerel.....	19,061,600	227,931	384,499
Halibut.....	3,104,400	268,693	383,461
Scallops (shelled) gals.....	163,305	301,282	322,537
Swordfish.....	1,785,300	150,274	230,798
Herring.....	22,670,400	141,900	366,815
Hake and cusk.....	14,105,300	62,284	243,374
Salmon.....	601,900	78,487	97,412
Pollock.....	7,521,000	37,496	79,511
Smelts.....	768,000	47,341	65,973
Oysters.....	983,800	23,955	28,660
Flounders.....	661,600	8,284	29,370

NEW BRUNSWICK

New Brunswick's fisheries, which in 1936 increased their production by about 20,000,000 pounds over the total for the previous year, fell in output by about this same quantity during 1937, owing chiefly to catch decreases of 17,505,200 pounds of sardines, herring 6,885,500 pounds, smelts 2,115,500 pounds and cod 1,549,000. To compensate to some extent for these losses, however, there was an outstanding increase in pollock production in the bay of Fundy of over 8,000,000 pounds and in lobster catch of 1,610,300 pounds in the eastern district. Notwithstanding the smaller total production, marketed values were somewhat greater. The reason for this, particularly in the Bay of Fundy district, which suffered the greatest decline in production, was that the marketed returns for cured pollock, canned clams and chicken haddies were substantially greater. There was also a decided increase in the marketed value of lobsters on the east coast.

The total production for the province was 138,336,400 pounds, valued to the fishermen at \$1,910,610 and marketed at \$4,447,688, compared with 159,326,100 pounds with landed value of \$2,099,754 and marketed value of \$4,399,735 in 1936.

The commercial catch of the inland district which is included in these figures and also includes the catches on the northwest and southwest Miramichi rivers, was 1,158,200 pounds, valued at \$43,141, compared with 1,183,000 pounds in 1936 valued at \$44,862. The chief varieties taken there were alewives, shad and salmon.

As previously stated in this report, the increase of 1,610,300 pounds in lobster landings can be attributed to the extension of the late fishing season northwards to include all of Kent county south of Eel river, and to much better fishing generally during the late season. There was no appreciable increase in the other districts where the spring season applied. Landed and marketed values were not in proportion to the heavier catch, lower prices being offered for market in proportion to the heavier catch, lower prices being offered for market lobsters and unfavourable conditions occurring later in the year in the canned markets, particularly the United States and France.

There was a slight improvement in the cod fishing in the Bay of Fundy, but on the north coast, and in Gloucester county in particular, there was a most serious further decline in production of over 2,000,000 pounds. This fishery affects a large section of the Gloucester shore and the plight of the fishermen of

the codfishing fleet there is deplorable. Notwithstanding some financial assistance extended during the past two seasons, the fishermen lack efficient equipment and the industry needs serious study and reorganization. The loss of the Italian market was a serious blow to the Gloucester fleet and much of the production is now pickle cured for the cutting trade. Due, however, to the run-down condition of the fishermen's equipment supplies of cod were not available in Gloucester county when there was a good demand for slack salted fish later in the season when prices as high as \$7 per hundred pounds were offered.

Conditions in the smelt fishery were unsatisfactory both with respect to production and markets. Prices on the ice were the lowest for years, resulting in decreases in return to the fishermen of \$93,897 and in marketed value of \$183,563.

While the provincial salmon catch decreased by 103,800 pounds this was largely due to unsuitable weather conditions during the trap net season in baie de Chaleur. Many of the nets above Bathurst were out of fishing order a good part of the season. The large drift net fishery of the Miramichi yielded increased returns both in catch and value. The trap nets on the Kent shore fished more successfully than for years; some think this due to the lobster season being closed during salmon fishing.

The catch of herring decreased heavily on both New Brunswick coasts. In the eastern district the spring variety taken have little market value and no serious effort was made to catch herring later in the season. In the Bay of Fundy the run of herring was light. The sardine catch also declined by over 13,000,000 pounds; the run of fish was lighter and not nearly as steady as in 1936. Conditions in the sardine canning industry on the United States side were not reassuring and the prospects for satisfactory market there are not bright for next year as there was quite a heavy carry over of stock at the end of 1937. The clam fishery continued to increase, the demand for raw clams for canning and export fresh being keen. The total clam production was over 7,000,000 pounds, equivalent to 36,000 barrels, or an increase of about 6,000 barrels. Of the total catch 30,000 barrels were taken in Charlotte county. Fear of depletion of the beds there is causing some anxiety and production may have to be further curtailed to allow the beds to recuperate.

The total catches with landed and marketed values and similar information covering the chief varieties taken by New Brunswick fishermen will be found in the following tables:—

1937

Total quantity of all fish landed, lbs.....	138,336,400
Landed value.....	\$ 1,910,610
Marketed value.....	\$ 4,447,688

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	7,258,600	713,801	1,089,002
Sardines.....	31,768,400	210,254	1,525,602
Smelts.....	4,272,000	209,672	295,296
Salmon.....	1,624,100	224,892	261,740
Herring.....	45,276,500	151,245	443,739
Cod.....	11,598,700	118,111	172,369
Oysters.....	2,309,200	51,277	75,487
Clams.....	7,200,200	46,920	114,475
Pollock.....	13,336,000	45,248	120,203
Shad.....	1,363,300	38,286	44,738
Alewives.....	4,414,900	26,120	52,015
Hake and cusk.....	4,584,900	19,328	54,005
Mackerel.....	1,012,700	16,045	36,211
Haddock.....	261,800	6,701	10,401

1936

Total quantity of all fish landed.....	lbs.	159,326,100
Landed value.....	\$	2,099,754
Marketed value.....	\$	4,399,735

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	5,649,900	692,125	916,850
Sardines.....	49,273,600	337,168	1,597,192
Smelts.....	6,387,500	303,569	478,853
Salmon.....	1,727,900	217,139	256,338
Herring.....	52,162,000	169,273	506,562
Cod.....	13,147,700	117,223	178,667
Oysters.....	1,821,800	35,178	58,508
Clams.....	6,246,200	34,219	71,614
Pollock.....	5,113,500	20,183	34,689
Shad.....	1,729,600	51,941	58,871
Alewives.....	6,180,900	30,870	66,606
Hake and cusk.....	6,080,300	21,541	46,740
Mackerel.....	1,018,600	13,095	21,535
Haddock.....	785,100	19,618	21,597

PRINCE EDWARD ISLAND

Total Prince Edward Island production of fish in 1937 was greater by 2,711,200 pounds than in 1936, due to increased catches of cod, herring, mackerel and hake. Returns to the fishermen decreased by about \$12,000 and the marketed value was smaller by almost \$83,000 than in the earlier year.

The lobster catch, which has been declining steadily since 1932, showed a further decrease of 104,800 pounds. Lobster fishing operations were carried on intensively under favourable weather conditions with an ample supply of early bait and no interference from drift ice. A large percentage of the lobsters caught were very small, more noticeably on the north side of the island. Changed regulations placed all of the west coast of Prince county in the late fishing season and there the catch was considerably greater than when the spring season applied, but due to unusually warm weather, following the opening of the season on August 10, some losses were sustained in smacking lobsters to the mainland canneries and pounds.

The island's catch of cod increased by half a million pounds and of hake by one and one-quarter million pounds. The bulk of the catch was pickle cured for export to the boneless trade. However, prices offered to the fishermen were hardly sufficient to encourage them to operate with vigor. The fishermen of west Prince, where the lobster season was closed during the spring, were assisted, under the federal-provincial aid plan, in the construction of fish curing premises at strategic points along the coast, so that they would be able to take full advantage of cod fishing in May, June and July when, as a usual thing, large quantities of these fish can be caught near the shore. The catches, however, were much smaller than anticipated, due to scarcity of fish, but it is hoped that the facilities provided will be of greater benefit to the fishermen in the future. Herring were plentiful during the spring months and were used mostly for bait. Some fall herring were pickled for the domestic trade. While gill-net fishing for smelts was better than in 1936 and prices favourable, the results of bag and box net fishing were not satisfactory. The fish ran small in size and the catch decreased by 294,300 pounds with a decreased market value of over \$13,000.

The oyster fishery, which in the past was so valuable to this district, produced 1,295,600 pounds (6,478 barrels) compared with 1,348,400 pounds (6,742 barrels) in 1936 and 2,002,800 pounds (10,014 barrels) in 1935. The decrease is entirely due to smaller catches from the public beds in Queens and Kings counties, but particularly the former areas. In Prince county east the catch of

oysters increased by over 1,000 barrels in the quantity marketed; in addition, however, about 1,700 barrels were removed from Bedeque bay areas on which unsatisfactory conditions existed, and were re-laid in pure water areas by lessees. There has been a substantial and steady increase in the production of the many oyster farms in east Prince during the past four years and oysters of the highest quality have been produced by lessees following methods advised by the federal biological station at Bideford. There was a substantial increase of 1,414 barrels in the production of the public beds of Orwell and Vernon rivers.

Prince Edward Island's total catches, with landed and marketed values, and similar information covering the chief varieties taken, will be found in the following tables:—

1937

Total quantity of all fish landed.....	lbs.	27,525,000
Landed value.....	\$	713,632
Marketed value.....	\$	870,299

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	5,823,800	524,847	538,792
Cod.....	6,750,400	49,868	88,900
Herring.....	6,492,800	35,752	66,964
Oysters.....	1,295,600	32,402	44,020
Smelts.....	890,000	29,220	40,856
Mackerel.....	1,116,400	18,079	28,958
Hake and cusk.....	3,823,700	14,244	33,026
Clams.....	701,000	3,505	14,141
Silversides.....	137,000	1,298	1,341

1936

Total quantity of all fish landed.....	lbs.	24,813,800
Landed value.....	\$	725,417
Marketed value.....	\$	953,029

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	5,928,600	544,365	614,789
Cod.....	6,212,000	48,581	103,867
Herring.....	5,649,800	29,372	66,987
Oysters.....	1,348,400	34,614	43,067
Smelts.....	1,184,300	37,408	53,896
Mackerel.....	1,067,200	14,016	28,569
Hake and cusk.....	2,559,700	10,623	25,365
Clams.....	392,800	1,672	6,556
Silversides.....	141,400	1,283	1,414

MAGDALEN ISLANDS

The total quantity of all fish landed in the Magdalen Islands during the year was less by 3,142,500 pounds than in 1936, chiefly owing to decreases in cod of 1,964,000 pounds, lobsters 239,200 pounds and herring 3,490,700 pounds. The mackerel fishery, which was almost a failure in 1936, increased by 2,461,500 pounds; a plentiful run of spring fish appeared and continued until the early summer when quantities were hooked and sold at prices above the average. A further falling off in the lobster catch of 239,200 pounds reduced the total catch to 1,730,400 pounds, compared with 1,969,600 pounds in 1936 and 2,170,700 pounds in 1935. Herring were late in appearing on the coast and some had spawned when they did strike in; they were unsuitable for smoking purposes

with the result that the smoke houses did not get needed requirements and bait was scarce. On the whole, it was a most unfavourable season for the fishermen who would have been in distress if they had not received assistance in the form of loans under a joint arrangement by the federal and provincial governments.

The total catches for the year, with landed and marketed values, and similar information covering the chief varieties taken will be found in the following tables:—

1937

Total quantity of all fish landed.....	lbs.	19,913,600
Landed value.....	\$	299,340
Marketed value.....	\$	425,312

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	1,730,400	176,284	199,527
Cod.....	3,901,900	45,106	53,684
Mackerel.....	3,907,000	42,084	98,783
Herring.....	10,083,900	20,168	53,095
Halibut.....	32,100	1,605	2,205
Smelts.....	22,300	1,268	1,338
Clams.....	235,000	1,175	2,225

1936

Total quantity of all fish landed.....	lbs.	23,056,100
Landed value.....	\$	293,488
Marketed value.....	\$	423,458

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	1,969,600	196,960	251,426
Cod.....	5,865,900	52,885	75,040
Mackerel.....	1,445,500	11,867	23,126
Herring.....	13,574,600	27,429	68,973
Halibut.....	5,000	250	250
Smelts.....	25,500	1,398	548
Clams.....	170,000	850	850

SPORT FISHING

NOVA SCOTIA

The year under review furnishes a good example of the relation between sport fishing and water and temperature conditions. The winter was not one of abundant snow, consequently there was no very heavy spring freshet but frequent precipitation during May and June provided ample water for the ascent of salmon in the rivers when they appeared on the coast. This was most evident in the rivers along the Atlantic coast of the province into which large numbers of salmon passed early in the season. Water levels were satisfactory until early July but later in that month there was a period of dry weather with very high temperatures which continued until September. Sport fishing reports indicate that there was an abundance of salmon in the rivers, and catches were very satisfactory during May, June and early in July but as soon as the dry warm period commenced, catches were reduced to a minimum, notwithstanding the known presence of fish in the pools.

Angling in Cape Breton.—In Cape Breton where the salmon season is later than on the mainland, conditions were more satisfactory than during 1936, although the catch by angling was only about average size. Salmon were late appearing on the coast and the dry summer materially affected the angling for them. Heavy rains during September, however, made good fishing until the season closed on October 15. On the Margaree the salmon catch by angling showed a slight increase over 1936. On North river St. Ann's the catch was more than double that of 1936 and almost equalled the catch on the Margaree. On other salmon rivers average catches were landed. The table below shows comparative figures of salmon taken by angling for past two years:—

	1937	1936
Margaree river.....	312	286
North river St. Ann's.....	309	126
Baddeck river.....	42	6
Grand river.....	40	37

Trout fishing throughout Cape Breton was materially better during the year than in 1936. On the Margaree waters an increase of about 33 per cent is estimated in the number of fish caught, with the trout running large in size. Large numbers of small trout were in evidence in the upper reaches and tributaries, arguing well for fishing during near future years. The catch at lake Ainslie was also better than during 1936, although falling short of the catch of 1935. Fishing in the new Boston area, which had been closed for three years, gave every assurance that this closure and the stocking of these waters had been very successful. Throughout other parts of the island trout fishing varied somewhat but on the whole was considered better than during 1936.

Angling, Eastern Mainland.—In the eastern part of the mainland the weather conditions general to other parts of the province also prevailed. Fair fishing during the early season to the middle of June was followed by low water and hot weather to the end of the season.

The salmon catch by angling was somewhat larger on the whole, although the catch on the St. Mary's river was greatly reduced. Many of the smaller rivers produced more fish and catches on the Musquodoboit and Ingram rivers were considerably greater than for previous years. The stocking of salmon waters in this part of the province is producing satisfactory results. The table below gives comparative salmon catches by angling on the principal rivers for 1937 and 1936:—

	1937	1936
St. Mary's river.....	375	930
Liscomb river.....	45	105
Ecum Secum river.....	78	82
Gaspereau brook.....	31	19
Isaac's and New Harbour rivers.....	96	29
Port Dufferin river.....	69	5
Sheet Harbor river.....	65	77
Tangier river.....	246	282
Ship Harbour river.....	45	29
Musquodoboit river.....	240	74
Lawrencetown water.....	168	150
Ingram river.....	478	175
Nine Mile river.....	61	15

Trout fishing in this part of the province was not as good as during 1936 due to water and warm weather.

Angling, Western Mainland.—In the western part of the province the salmon catch, by angling, was not up to that of 1936. This was due chiefly to lack of rainfall and hot weather, particularly after July 1st when salmon could not be induced to rise to the fly. The Mersey, Medway, LaHave and Annapolis rivers continued as the best salmon waters with increased catches being registered in the LaHave and Annapolis areas. The following table gives comparative catches by angling for the principal salmon rivers in the western mainland in 1937 and the year before:—

	1937	1936
<i>Lunenburg county—</i>		
East river.....	28	41
Middle river.....	50	68
Gold river.....	91	65
LaHave river.....	344	200
Petite Riviere.....	238	200
<i>Queens county—</i>		
Medway river.....	613	715
Mersey river.....	637	993
<i>Shelburne county—</i>		
Roseway river.....	2	7
Clyde river.....	30	97
<i>Yarmouth county—</i>		
Tusket river.....	60	114
<i>Digby county—</i>		
Salmon river.....	43	30
<i>Annapolis county—</i>		
Lequille river.....	19	78
Round Hill river.....	99	106
Annapolis river.....	139	114
Nictaux river.....	*	58
<i>Kings county—</i>		
Gaspereau river.....	48	55

*Figures incomplete.

Trout fishing in this district, as in the rest of the province, was good during the first half of the season but during the latter part of the season the catch fell off more than usual. This condition was evidently wholly caused by lack of water.

Deep Sea Sport Fishing.—During the past few years deep sea sport fishing has been developed along the coast and it is fast growing into a main tourist attraction. Enterprising individuals and groups of fishermen and boat owners have equipped their boats for rod and line fishing for tuna, swordfish and line fish, and sport fishermen from all over the continent and from foreign countries tried their skill during the past year. Tuna are to be found all along the Atlantic coast of the province but local facilities have been developed chiefly along the southwestern shore. Tuna vary in size considerably but are all large fish. The record fish caught in Nova Scotia waters during 1937 by rod and line, which was also a record for North America for the year, weighed 821 pounds. Some idea of the growth of tuna sport fishery can be obtained when the record of one port for 1936 and 1937 is considered. At this port a total of 181 tuna were landed by anglers with a total weight of approximately 50,000 pounds, as against 54 tuna landed with a total weight of approximately 14,000 pounds in the corresponding period of 1936.

Angling for swordfish also offers great possibilities. During 1936 and 1937 considerable preparation for this type of deep sea angling was made in Cape Breton waters where fish usually school early in July and remain until mid-September.

NEW BRUNSWICK

Bay of Fundy Section.—During 1937 salmon fishing in the Fundy section of New Brunswick showed some slight improvement over 1936. About the usual number of fish were taken on the St. Croix river at Milltown below the cotton mill dam. On the Magaguadavic river, where for the past few years salmon have been passed over the falls at the mouth, fishing has been improving and thirty salmon were reported taken by angling in 1937 at Second falls about ten miles from the mouth. An investigation of spawning conditions on this river made late in the year gave indications of steady improvement. On Salmon river, St. John county, 32 salmon were taken, and spawning conditions were favourable. Garnett stream and Black river did not offer as good fishing as usual. The land-locked salmon fishery in Chamcook lake showed an improvement and 132 fish were taken, some weighing five or six pounds.

Trout fishing generally was not as good as usual although conditions showed improvement on Garnett stream and Black river.

Deep Sea Sport Fishing.—A deep sea sport fishing club was organized at Saint John, but no tuna were reported caught by rod and line. Pollock fly fishing was poor during the year. Evidently the scarcity of shrimp, resulting in a scattering of the pollock schools, was a contributing factor.

Eastern District.—In this district, in common with the rest of the Maritime Provinces, conditions for angling were far from ideal. During May and June water conditions were favourable but dry hot weather followed.

Salmon angling in this district produced fewer fish than during 1936. The Restigouche River catch, for reasons given above, fell off badly. On Jacquet river fishing continued to show improvement in spite of adverse weather conditions. Nipisiquit river also showed an increase. On the Tabusintac river, where early fishing for black salmon has been increasing, the total catch of black and fresh run salmon nearly doubled the 1936 catch. Fresh run salmon are fished on this river during late September and during October.

The following table gives salmon catch by angling on the principal rivers:

	1937	1936
<i>Restigouche county—</i>		
Restigouche river.....	1,800	4,280
Upsalquitch river.....	167	380
Patapedia river.....	50	130
Kedgewick river.....	529	415
Jacquet river.....	130	90
<i>Gloucester county—</i>		
Nipisiquit river.....	303	115
Tetagouche and Middle rivers.....	16	10
<i>Northumberland county—</i>		
Tabusintac river.....	634	370

Trout fishing in this district was not as good as during 1936. Restigouche, Gloucester and Kent catches were smaller while Northumberland and Westmorland showed better fishing than in the preceding year. This whole district is crossed by innumerable rivers, lakes and streams, offering a variety of trout fishing under all conditions of water.

Inland District.—Water and weather conditions in inland New Brunswick were very bad for angling, in fact water became so low during the summer months as to cause a considerable loss of fish life. Notwithstanding this, the catch of salmon, by angling, on both the Saint John and Miramichi systems showed an increase over both 1935 and 1936. The catch of grilse showed

a slight increase on the Saint John but on the Miramichi it was less than one half the 1935 catch. However, the 1935 catch, with which is included the catch of black salmon, was abnormally large.

On the Saint John river 1,316 salmon and 1,349 grilse were caught as compared with 755 salmon and 1,182 grilse in 1936 and 688 salmon and 802 grilse in 1935.

For reasons unknown, salmon angling at Hartt's Island pool proved almost a complete failure. Only 50 salmon and grilse were taken as compared with 680 during 1936. The Nashwaak river showed an increase in catch over 1936; there was good fishing during late September and early October and a total of 132 salmon and grilse were caught as compared with 71 taken during 1936.

Bristol, Bath and Hartland pools in Carleton county produced the following angling catches:—

Bristol.. . . .	197 salmon and 120 grilse
Bath.. . . .	156 salmon and 168 grilse
Hartland.. . . .	120 salmon and 218 grilse

On the upper reaches of the Saint John river an increased catch over 1936 was recorded. On the Tobique river 623 salmon and 595 grilse were taken as against 454 salmon and 384 grilse in 1936. On Salmon river the catch was 104 salmon and 121 grilse as compared with 98 salmon and 103 grilse. Angling in these waters was particularly good during the early part of August when a good rise of water obtained. One instance is reported where two fishermen each caught his weekly bag limit (30 salmon) in two days' fishing.

On the Miramichi River system during early fishing for black salmon, prior to May 24, 237 non-resident fishermen were licensed. In this fishing the licensees are allowed to take one black salmon per day. It is estimated that considering all monies expended by these sportsmen this early fishery is worth about \$30,000 to the province, or approximately \$20 per fish taken.

The first bright or fresh run salmon appeared on the Miramichi river on May 3, being taken at the mouth of Cains river.

The southwest Miramichi river, Northumberland county, produced by angling 3,105 salmon and 4,325 grilse as compared with 3,100 salmon and 10,145 grilse in 1936.

The catch on the northwest Miramichi, including Little southwest and Sevogle rivers, was 1,160 salmon and 2,800 grilse; in 1936 the catch was 1,030 salmon and 9,321 grilse. On the upper reaches of the southwest Miramichi, including Rocky brook, in York county, the best fishing for a number of years was experienced, particularly during early June and August and September.

The reported catch was 858 salmon and 2,666 grilse, compared with 428 salmon and 3,063 grilse reported during 1936.

Trout fishing throughout the district compared favourably with that of 1936. Although the catch reported was somewhat less, this is attributed to the fact that residents were not permitted to enter the woods during the dry weather when forests had to be protected from fire danger.

Reports received covering the spawning of both salmon and trout are, in effect, that average or better than average spawning conditions obtained. Salmon are known to have gone far up rivers and streams.

PRINCE EDWARD ISLAND

Angling in Prince Edward Island is confined principally to trout fishing in ponds and streams above and to sea trout fishing in waters below the dams.

Fishing during the months of May and June was especially good, weather conditions being ideal. After June and until the end of season conditions were unfavourable and catches poor. After the season closed water conditions improved and were favourable for spawning.

In the Dunk river, east Prince county, angling was exceptionally good, water conditions being favourable during the best fishing periods and in the late summer for spawning. In west Prince county there are no large rivers in which angling is carried on. Sport fishing in this area is done in streams and mill ponds, where conditions were generally good in 1937.

In Queens county conditions varied from unfavourable to good. On Black river, where good fishing was reported in 1936, water conditions were unfavourable in 1937 and angling poor and spawning conditions poor. On Hope, Trout and Wheatley rivers water conditions were fair, angling was good and spawning conditions were favourable. At the head of Hillsboro river and on other rivers in the county fishing was not as good as during the previous year but on ponds it was equally as good and spawning conditions were favourable. In Glenfinnan lake rainbow trout fishing was reported good during July but after that month very little fishing was done. No rainbow were taken from O'Keefe's lake.

In Kings county good fishing was reported from Morell and Naufrage rivers and from East lake while fair angling obtained on Fortune river and Big pond. Spawning conditions were favourable. Some 58,500 eggs were obtained through stripping trout from the Fortune while from the Morell river over 2,500,000 eggs were secured for hatchery purposes.

FISHERIES PROTECTION SERVICE

Splendid service was rendered by both the *Arras* and *Arleux* in the waters of the Atlantic coast of the Maritime Provinces throughout the entire year. The vessels were busily engaged protecting the fisheries in the territorial waters of the provinces, rendering assistance to vessels and boats in distress, and breaking ice in harbours to release fishing boats to enable them to proceed to and from the fishing grounds. They were also called upon from time to time to perform various other duties in the interest of the fisheries generally.

The vacancy caused in May by the death of Captain Clement Barkhouse, who was in command of the *Arras* for many years, was filled by transferring Captain H. P. Cousins, of the *Arleux*, to the *Arras* as commanding Officer. The vacancy thus caused on the *Arleux* was filled by promoting First Officer R. I. Swansburg of the *Arleux* to captain of that ship. These transfers became effective June 1.

The *Arras* at the opening of the season was engaged patrolling the waters of southwestern Nova Scotia between Yarmouth and Shelburne. She was busily occupied in protecting the lobster fishery in this district, assisting fishing vessels in distress, and supervising the movements of foreign fishing vessels, as well as in breaking ice at Yarmouth, Shelburne, and other ports to release fishing vessels and boats. Several navigation buoys adrift were picked up by the ship and towed to safe ports to be handed over to the proper department. The *Arras* was laid up for annual overhaul at Yarmouth from March 6 to April 11. Upon the completion of the annual overhaul she took up patrol duties between Yarmouth and Halifax in connection with the protection of the lobster fishery and the protection of territorial waters along that section of the coast from infringements by foreign mackerel seiners.

The *Arras* sailed for the Grand Banks with the fishing fleet June 12 to act as a hospital ship during the summer months, arriving at Burin, Newfoundland, June 15. With reference to the work of the *Arras* on the banks, Captain Cousins commented as follows:—

"During the summer season 23 Lunenburg vessels operated on the Grand Banks. The ship's doctor gave medical treatment 525 times. The catch by the Lunenburg vessels averaged about 2,500 quintals per vessel, this being the most successful catch for several years.

"There were 37 French trawlers and 49 Portuguese trawlers on Grand Banks first part of season; later the greater part of these left for Greenland."

While on the Grand Banks, weather, bait and ice reports, etc., were broadcast daily from the *Arras* to vessels of the fishing fleet. The ship left Newfoundland on August 30, returning to Nova Scotia waters where she resumed duties along the southwestern coast of the province. From November 17 to December 31 the vessel was stationed at Canso acting as a mother ship to the winter fishing fleets operating from Canso, Petit de Grat and vicinity. During the year the ship spent 188 days at sea, steaming 11,224 miles.

During most of the month of January the *Arleux* acted as a mother ship with the winter haddock fishing fleets operating from Canso, Petit de Grat and vicinity. She then carried on regular patrol duties from Halifax west along the coast of the province in connection with the protection of the lobster fishery. From February 3 to 14 the vessel was engaged on biological work on the coast and offshore fishing banks between Shelburne and Canso. The work performed by the ship in this connection was very much appreciated by the Fisheries Research Board which had asked for the use of the vessel in this way.

The *Arleux* was laid up for annual overhaul at Lunenburg from February 17 to April 2. Upon the completion of overhaul she took up lobster protection work and ice breaking along the eastern coast of Nova Scotia. However, the boat was again called upon to serve in connection with the protection of the lobster fishery in the Northumberland straits. She was usefully engaged in this work from April 23 to July 8, principally protecting the closed area south of the Eel river—North point boundary line. From July 9 to August 7 the vessel patrolled the waters of southwestern Nova Scotia. She returned to the Northumberland straits on August 8 and remained in that area until September 28 being engaged in lobster protection work both in the straits and along the north shore of Prince Edward Island, principally off Prince county. Particular attention was given to the protection of berried lobsters and checking fishermen for lobster fishing licenses in the open district.

Upon the completion of this work the vessel was engaged from September 29 to the end of the year protecting the lobster fishery, the scallop fishery, and the three-mile limit on the eastern and southwestern coasts of Nova Scotia. The ship spent 180 days at sea and steamed 10,376 miles while 2,339 miles were covered by her motor boat.

FISHERIES PATROL SERVICE

NOVA SCOTIA

In the island of Cape Breton, the chartered patrol boat *Cabar Feidh* patrolled the waters of lobster fishing district 6A from May 17 until July 16 and covered a distance of 874 miles. Although no violations of the fishery regulations were reported by the captain during his patrols the services performed were satisfactory and it is considered the presence of the boat in the district had a beneficial effect in preventing any illegalities which might have otherwise taken place.

Along the eastern coast of the mainland the patrol boat service was carried on by two boats owned by the department, *Venning* and *Gilbert*, and three smaller chartered boats, *Marmat*, *Daisy L.* and *Sadie B.*

The *Venning* commenced patrol work on April 1, after having had the necessary annual repairs made, and operated to superintend the opening of the lobster fishing season in district 5, continuing from there to district 7 to check licences and do other necessary work until June 1. On June 2 the boat proceeded to New Brunswick district No. 2 and had charge of the line defining the drift net fishing limit in the Miramichi river until July 3. General patrol work was then carried on along the Atlantic coast, the boat returning to the strait section on July 31 to take up the work in connection with the fishing in district No. 8.

Continuous patrol with occasional visits to Prince Edward Island areas was carried on until November 6 when the boat returned to the Atlantic coast and worked in Halifax county until laid up for annual overhauling. A total of 8,690 miles were travelled during the time of operation.

The *Gilbert* was placed in commission on May 3, leaving Halifax on the fourteenth of that month to proceed towards Pictou. Patrol work was carried on until May 20, the boat then proceeding to Newcastle on her way to Bay Chaleur to tow salmon pontoons for the hatchery branch. Work was continued in New Brunswick areas for the hatchery service and also on the drift line on the Miramichi river until August 3. From that date onward the boat was used in the eastern section of the strait area with occasional patrols to Halifax until November 12. The *Gilbert* then proceeded to Port Beckerton to act as mother ship for the fishing boats operating from that port but owing to engine trouble was forced to discontinue this work on November 28. She was later towed to Halifax and her services terminated on December 31. The total number of miles travelled was 5,751.

It was impossible to secure the *Marmat* for patrol work until June 2 when this boat was placed on charter. She patrolled continuously in the strait area from that date until October 19, being used to check licences while the season was open in district No. 7 and for a short time to do some work in lobster investigation and later to patrol the boundary line between districts 7 and 8 of River Philip. The total number of miles travelled was 3,879.

The *Daisy L.*, a small open motor boat, was placed on charter on August 9 and was continuously engaged until October 9 in patrol work in the area immediately adjacent to Malagash point. The total number of miles patrolled was 1,442.

The *Sadie B.*, also a small open motor boat, was placed on charter on August 9 to meet a situation arising from the enactment of the new regulation to the effect that lobster fishing boats and gear that had been used during the spring season could not again be used during the fall season, and also to check licences in the open district in the fall season in Cumberland county. She continued this work until September 30. A total of 1,338 miles was travelled during the time she was on charter.

Close co-operation obtained between the patrol boats engaged in this district and the work carried on by them was entirely satisfactory. Illegal lobster fishing in the strait section was kept at a minimum and every effort was made to see that all the regulations were observed fully.

In the western district, patrol was carried on by the department-owned boats *Capelin* and *Halkett* assisted by small chartered boats, one at Yarmouth, one at Clark's harbour and one which operated in the vicinity of Chester.

At the beginning of the year the *Halkett* was engaged in lobster protection work, checking up on fishermen and boats for licences, etc. She made a search for and located on January 5 a disabled fishing boat off Western head and towed her to Liverpool. The *Halkett* was laid up from February 28 to April 2 at Lunenburg for annual overhaul. During April and May the boat performed valuable services in preventing attempts at illegal salmon fishing, particularly in the vicinity of the Medway estuary, Queens county. June, July and September were occupied in regular patrol duties enforcing the lobster fishery regulations. The remainder of the year was spent patrolling the coasts of Lunenburg, Queens and Shelburne counties. A total of 5,383 miles was patrolled by the *Halkett* during the season.

The *Capelin* patrolled throughout the year the waters of the Nova Scotia coast of the Bay of Fundy from Pubnico to the headwaters of the bay. During the winter months she acted as a mother ship to the haddock and lobster fishing fleets in St. Mary's bay and adjoining districts in the Bay of Fundy. Through the season the *Capelin* towed into port eleven boats that had developed engine

trouble and rendered towing assistance to four schooners. Her services were quite satisfactory and no doubt her work was instrumental in keeping down illegal lobster fishing. A total of 7,041 miles was covered in patrol duties during the year.

NEW BRUNSWICK

In the Bay of Fundy section the department's patrol boats *Gannet Rock* and *Thresher* were again employed throughout the year. The *Gannet Rock* performed good work in preventing illegal lobster fishing during the summer months and in enforcing the lobster size limit during the open season. The *Thresher* operated from Welchpool and carried on a general patrol service throughout the districts.

The patrol boat *Gannet Rock* operated at Grand Manan during the entire year, covering 4,924 miles. As the boat was worn out a new boat was ordered from George E. Richardson and Sons, Richardson, N.B. The new craft, which will be an improvement on the old one in every respect, will go in commission early in 1938.

The *Thresher* was in commission all the year and covered 11,281 miles. The *Thresher* plays an important part in the coastal patrol service of the district, as well as rendering necessary aid to disabled fishing boats, and also in procuring doctors for needy sick persons and taking them to hospital when necessary.

Two small boats, the *Elsie* and the *Echo*, also were employed. The former operated at Maces bay and the latter at Grand Manan. Both rendered valuable assistance in enforcing the lobster fishery regulations.

In the eastern section of the province the following chartered boats were employed in the Northumberland straits area: *Gulf Rover*, *Gulf Ranger*, *Gulf Racer*, *Gulf Raider*, each with a crew of two. They did splendid work in the protective service and in giving aid to fishermen. They were mainly used in the lobster, salmon, oyster and smelt fisheries. In addition two department boats, the *Gilbert* and *Venning*, were employed for a few weeks, the *Gilbert* on the salmon trap-net fishery on the Restigouche and the *Venning* on the Miramichi statutory drift-net line. In addition one unchartered boat the *Brant*, belonging to Inspector Willison, was used for patrol work in Miramichi bay. The following table shows the dates of service and the mileage of the district chartered boats:—

Name of Boat	Dates employed	Mileage
<i>Gulf Ranger</i>	April 27—Nov. 2	7,978
<i>Gulf Raider</i>	April 29—Nov. 3	5,664
<i>Gulf Rover</i>	May 7—Nov. 6	5,059
<i>Gulf Racer</i>	May 25—Nov. 30	7,619
<i>Brant</i>	April 24—Nov. 20	3,282

PRINCE EDWARD ISLAND

Eight patrol boats were engaged during the season in fisheries protection work in Prince Edward Island and were allocated as follows: three in West Prince, one in East Prince, one in Kings, and three in Queens. Assistance was also given by the department-owned patrol boat *Venning* and the *Arleux* at intervals during the lobster fishing season.

The *Langholm*, a chartered boat, was commissioned in the service on April 27 and performed continuous duty from that date until November 20, checking licences, marking the divisional line and preventing illegal lobster fishing principally. The *Langholm* patrolled the district North cape to Hardy's channel, covering a total mileage of 6,948. The services rendered by this boat were satisfactory in every way.

The small chartered boat *Isobel* patrolled the district, Cascumpec bay to Goose harbour and vicinity, from July 12 to October 31, covering in its efforts to prevent illegal fishing 3,235 miles. Satisfactory services were rendered.

Another small chartered boat, *Finsler*, patrolled in the vicinity of the North Point line August 11 to October 31 to prevent the transfer of lobsters by boat from the closed to the open area. The services rendered were very satisfactory and a total of 595 miles was patrolled.

The *Capitol*, which was taken over by the department from the Royal Canadian Mounted Police in 1937, was renovated and equipped with an aeroplane engine to afford sufficient speed to cope with fast operating crafts engaged in illegal fishing operations. The *Capitol* was employed in the Malpeque-Hardy's channel area for the period July 1 to October 31, patrolling during that time a total of 3,652 miles. To the speed of this boat and to its ability to navigate in shallow water may be attributed the practical absence of illegal fishing in east Prince county. This boat took an active part in the capture of three motor boats used by poachers. One of these boats was of the very fast type and owned by an old offender who had, to the knowledge of the officers, been engaged in illegal fishing operations for some years but had successfully evaded capture in the past as his boat's speed enabled him to escape before the officers could obtain evidence of illegal fishing or possession of fish.

The *Seawitch* was chartered for patrol duty in the Victoria-Georgetown districts on May 15 and was engaged until October 30 in checking lobster fishing licences, checking boats and fishermen for spawn lobsters, and the protection of the lobster industry in general. The services of this boat were effective. All told, 7,220 miles were travelled during the season.

The *Seabird*, a chartered boat, operated in the Malpeque-North Lake area from August 1 to October 15, during which time some 1,876 miles were patrolled.

The *Beulah* was chartered for lobster patrol service on July 10 and continued in that service until October 10, giving satisfactory service. During the season this boat patrolled 1,854 miles.

The chartered boat *B. and B.* replaced the government owned boat *F. D. B. No. 2*, which was disabled on August 5 when en route from Malpeque to Kings county for patrol duty. The *B. and B.* patrolled the Souris-Georgetown area from August 8 to October 15, performing most effective service in the prevention of illegal lobster fishing.

Speaking generally of the fisheries protection and patrol service throughout the division, and in particular of this service in the gulf area where in the past there has been the greatest difficulty in preventing illegal lobster fishing, it can be said with some assurance that there was the most effective protection during the period that has been known as the "poaching season." Plans were formed early in July for the co-ordination of land and water protective forces in the gulf area, with results that made it impossible for illegal fishing to be carried on with any degree of success.

LOBSTER CANNERIES, INSPECTIONS AND GRADING AND LOBSTER PACK

Lobster Packing Licences.—During the year licences to pack lobsters and tomalley were issued covering 241 canneries. Of this number, 239 canneries were actually operated, as compared with 256 in 1936; 270 in 1935; 293 in 1934; 289 in 1933 and 311 in 1932.

Comparative figures, by provinces, show the following cannery distribution:

—	1937	1936	1935	Decrease	
				1937-6	1937-5
Nova Scotia.....	72	76	78	4	6
New Brunswick.....	78	81	86	3	8
Prince Edward Island.....	74	84	90	10	16
Magdalen Island.....	15	15	16	.....	1
Totals.....	239	256	270	17	31

Lobster Pack.—By Order in Council of April 23, 1937, the northern boundary of the fall lobster fishing season was moved from the Chockfish-West Point line to the new line from Eel river, New Brunswick, to North point, Prince Edward Island. As a result of this change 22 canneries producing 5,158 cases, which had operated in the spring season of 1936 were placed within the fall season for 1937. This change, therefore, must be noted when comparisons of pack between seasons of different years are considered.

During 1937 the figures show a total production of canned lobster within the Maritime Provinces and the Magdalen Islands of 88,181 cases, compared with 87,390 cases canned during 1936, an increase of 791 cases or of less than 1 per cent.

Comparing the 1937 pack with that of previous years, the following results are seen:—

Year	Pack	Increase or Decrease, cases	Percentage Increase or Decrease
1937.....	88,181		
1936.....	87,390	+ 791	+ 00.90
1935.....	98,964	— 10,783	— 10.9
1934.....	114,679	— 26,498	— 23.1
1933.....	120,771	— 32,590	— 27.0
1932.....	164,981	— 76,800	— 46.5
1931.....	145,488	— 57,307	— 39.4
1930.....	138,069	— 49,888	— 36.2

Provincial statistics of pack for 1937 show a decrease in pack in Nova Scotia, Prince Edward Island and Magdalen Islands with an increased pack in New Brunswick:—

Province	1937 Cases	1936 Cases	Increase, Decrease, Cases
Nova Scotia.....	34,649	37,690	— 3,041
New Brunswick.....	26,957	20,428	+ 6,529
Prince Edward Island.....	20,952	22,345	— 1,393
Magdalen Islands.....	5,623	6,927	— 1,304
	88,181	87,390	+ 791

The pack for Nova Scotia during 1937, compared with 1936, shows a decrease of 8.1 per cent, the New Brunswick pack shows an increase of 31 per cent, while Prince Edward Island and the Magdalen Islands both register decreases, in the case of the former 6 per cent and in the case of the latter 19 per cent.

During the spring season 1937, 67,267 cases of lobsters were put up, as against 78,976 during the spring of 1936. While this shows a short pack of 11,752 cases, or 15 per cent, the exclusion of 22 canneries with a 1936 pack of 5,158 cases from the spring district must be considered. Provincial figures covering spring pack all show decreases:—

Province	Cases 1937	Cases 1936	No. of Cases Decrease	Percentage of Decrease
				%
Nova Scotia.....	33,889	37,026	3,008	8
New Brunswick.....	10,232	13,467	3,416	25
Prince Edward Island.....	17,523	21,556	4,025	19
Magdalen Islands.....	5,623	6,927	1,303	19

During the fall season 1937, the pack was 20,914 cases as against 8,392 cases in 1936, an increase of 12,525 cases or a percentage increase of 149 per cent. Of the 22 canneries operated in the spring season of 1936 and subsequently placed in the fall season for 1937, 18 operated and produced 9,339 cases, or 45 per cent of the fall pack.

The largest increase in cases packed obtained in New Brunswick, while the largest percentage of increase was in Prince Edward Island, as shown by the following table:—

Province	Cases 1937	Cases 1936	No. Cases Increase	Percentage Increase
Nova Scotia.....	760	647	113	% 17
New Brunswick.....	16,725	6,957	9,771	140
Prince Edward Island.....	3,429	788	2,641	335

A further comparison of the fall district pack can be made from the following tabulation:—

Year	Pack	Year	Pack
1937.....	20,914 cases	1934.....	8,214 cases
1936.....	8,392 cases	1933.....	13,570 cases
1935.....	5,370 cases	1932.....	18,163 cases

Cannery Inspection.—During 1937, the usual careful attention was given to the inspection of all canneries and 1,394 inspections were carried out by 35 inspecting officers. The average number of inspections was about six per cannery.

Reports received from the various lobster canning districts indicate that inspecting officers are well received by cannery operators, and that suggestions made toward improving the pack are now more readily acted upon than was the case some years ago. Cannery operators generally are seeing the need of producing the best pack possible. As a result there was, during the year, a marked improvement in cannery equipment, sanitation and operation in Nova Scotia, Prince Edward Island, Magdalen Islands and in the greater part of New Brunswick.

Underweights.—During the year, particular care was again given to “underweights” and the fact that only sixteen instances of suspected underweights were reported, as against twenty-three, during 1936 and twenty-nine during 1935, can be taken as indicative of better cannery practice. Of the sixteen suspected lots fourteen were adjudged “underweight.”

Grading.—During the year, Dr. Ernest Hess, of the Fisheries Research Board, visited, as far as possible, all canneries not visited during his inspection tour of 1936. The 1937 tour took him into New Brunswick and Prince Edward Island during both the spring and fall seasons. This independent grading by Dr. Hess should be responsible for a more uniform grading by inspectors of all canneries. His findings during 1937 were similar to those of 1936. With few exceptions it was found that canneries had been competently and uniformly graded by fisheries inspectors.

INSPECTIONS UNDER THE FISH INSPECTION ACT

The regulations governing the construction and capacity of containers and the curing, packing and inspection of the varieties of fish coming under the Fish Inspection Act were enforced by the qualified inspectors of the division who are authorized to undertake this work. It was again found necessary to employ three temporary inspectors to assist in the districts which are the

heaviest producers of salt mackerel and herring; one of these temporary officers had to do in particular with the inspection of empty containers in the coopers' hands in Eastern Lunenburg county.

The regulations provide for the inspection and marking of empty containers and containers filled with salt mackerel and herring, oysters and hard cured smoked round herring, and for the inspection of fish curing establishments. During September further regulations were adopted dealing with the inspection and supervision of the shucking, handling and shipping of scallop meat. The purpose of these regulations was to improve sanitary and other conditions by specifying the conditions that must be maintained on the boats and in the packing premises and providing for the washing of the meat in pure sea water or in brine made from pure water taken from approved sources. Metal shipping containers were also specified but the enforcement of this requirement was deferred until the opening of the next season. Producers and shippers were also obliged to have certificates issued under conditions approved by the Department of Fisheries and the Department of Pensions and National Health. To assist the local officers of Digby and Annapolis counties in enforcing these provisions one outside inspector was stationed at Digby for the greater part of the season and two temporary assistants were employed, one stationed at Victoria Beach and port Wade and the other at Centerville. Marked improvement in conditions on the boats and in the shore premises was observed and a superior product was placed on the market. The thirteen gallon wooden shipping keg, however, has been the chief cause for complaints. This type of package cannot be iced and has been found unsuitable for shipping scallops particularly in mild weather and it will be eliminated when the metal containers are required by regulation next October.

New regulations providing for the grading of frozen smelts in Restigouche and Gloucester counties, New Brunswick, also became effective in September. Consideration had for some time been given to the compulsory grading of smelts and as an initial step this plan was tried out in the districts where, experience showed, there was the greatest difficulty with ungraded shipments going on the market. As a general rule, smelts from New Brunswick's east coast were graded while in the dealers' hands but the grading was not standardized. The department was furnished with definite evidence that ungraded shipments reaching the market had caused dissatisfaction, which resulted in reduced returns generally.

The grading regulations provide a grading for size only—for Extras, No. one's, two's and three's—and allow a tolerance of ten per cent for each grade, provided that no smelts falling below one-half inch of the minimum size stipulated for the grade under inspection shall be included in the tolerance. The inspectors open a certain proportion of the boxes in each shipment and if the grades are found to be in accordance with requirements, each box is marked with the words "Graded for Size." Experience with the grading regulations has been most satisfactory, from the standpoint of both the fishermen and the receivers. The permanent officers in Restigouche and Gloucester counties undertook responsibility for the inspection and were assisted by four temporary assistants stationed at Shippigan, Shippigan and Miscou Islands, Charlo-New Mills and Dalhousie shore. In all, 7,481 boxes of frozen smelts were graded and marked during December. Reports received from dealers in the United States indicate that the regulations were most helpful in standardizing the product. The regulations have also received the support of the majority of fishermen and shippers, many of whom feel that they should be applied throughout the province.

Supervisor Robert Gray, who is directly responsible for the work under the Fish Inspection Act in this division, reports as follows with regard to inspections, etc., during the 1937 season:—

"Five thousand five hundred and seventy-seven inspections of containers and fish were made; 3,797 visits are reported as having been made for educational purposes, but I am convinced more educational work is carried on than is reported; 3,943 inspections of fish curing premises, fish houses and curing utensils, etc., were conducted during the year and conditions, as to cleanliness, are reported good; 348,055 empty containers were inspected, 322 of which were reconditioned and 49 condemned.

"Of the 11,242 barrels of alewives inspected, 69 were found to be 'Below Quality' and officially stencilled as such.

"A total of 41,263 barrels, 327 half-barrels and 130 pails of mackerel were inspected, of which 2,259 barrels, 6 half-barrels and 3 pails were reconditioned, mostly because of short weights, and 761 barrels, 3 half-barrels and 1 pail found to be 'Below Quality.'

"The inspection of 6,278 barrels, 5,867 half-barrels, 24 quarter-barrels and 6,791 pails of herring resulted in 234 barrels, 91 half-barrels and 88 pails having to be reconditioned and 72 barrels, 2 half-barrels, 5 quarter-barrels and 4 pails found to contain 'Below Quality' fish.

"The appearance of what is termed 'Soft Back' herring was reported from Isle Madame and Canso toward the end of August and, after investigation, it was generally agreed that herring found in that condition, after being not less than two weeks in salt and pickle and being abnormally fat, had been left too long in nets in warm water and had been placed in curing receptacles under adverse conditions, such as small fish houses minus ventilation.

"262,555 boxes of hard cured smoked round herring were inspected, 500 of which were found to be 'Below Quality.'

"17,119 barrels and 2,487 boxes of oysters were inspected, 527 barrels and 52 boxes of which had to be reconditioned, principally because of slack filling, and one barrel was found to contain dead oysters.

"There were two prosecutions for violating the regulations made under the Fish Inspection Act during the year.

"In Lunenburg county the services of an inspector are to be continued during the winter months and, no doubt, this will help to improve the standard of the pickled fish containers made there, both as to the quality of the material used in their construction and the workmanship.

"This year, again, we had slight trouble because of the size, count and weight of mackerel not corresponding but that was overcome by allowing a tolerance in the count, and now it is proposed to make provision for such a tolerance in the regulations to suit the requirements of the trade when that is found necessary.

"Although the catch of herring was higher this year than in 1936, fewer were cured in salt and pickle, probably because of the low price offered for the cured article and the fact that there was a demand for fresh herring which were frozen and will ultimately be used for bait.

"An amendment was made by Order in Council dated May 5, 1937, reducing the minimum size of long oysters from four to three and one-half inches and apparently this change is working out well as no reports have been received by me to the contrary.

"During the year there were eleven reinspections which is no reflection either on the department or its officers when the amount of work done is taken into consideration. These reinspections, covering in all only 119 barrels of mackerel, 39 barrels of herring, 66 barrels of alewives and 500 boxes of hard cured smoked round herring, resulted in 48 barrels of mackerel being rejected as sour and 64 as requiring reconditioning. In the case of seven barrels of mackerel the word 'Large' was removed and 'Medium' substituted.

"The 39 barrels of herring were culled out of hundreds of barrels marked 'Bright' which were being converted into 'Headless' or 'Dressed' herring because of the scarcity of 'Grocery' fish. These few barrels contained fish which were rather dark in colour for this purpose, hence the word 'Bright' was erased and the word 'Tropics' stencilled thereon in lieu thereof and those fish were probably shipped to the West Indies where they were originally intended for.

"The 66 barrels of alewives, which were officially stencilled 'Below Quality' were late caught fish, spent and soft, and just in a condition where no layman could be expected to make up his mind conclusively as to what should be done with them.

"The 500 boxes of hard cured smoked round herring were also late caught fish, carelessly culled and had been subjected to entirely too much heat and smoke; consequently, they were stencilled 'Fish Below Quality.'

"As required by Section 28 of the regulations, containers filled with pickled fish are now usually kept well protected from the weather which means less pickle is lost and fewer fish become rusty. This is quite a contrast in comparison with what one would see only a few years ago.

"The work of conducting the inspection of 693,000 pounds of dry cod and 1,811,750 pounds of dry pollock for consumption in Western Canada, and 144,000 pounds of dry cod

for the United States markets was, in my opinion, carried out efficiently, and the fact that only one complaint, which appeared to be very trifling, was made would bear me out in that opinion. Quite a proportion of those fish were tied up in bundles before inspectors saw them and, with limited time at their disposal, it was impossible to open every bundle, inspect each individual fish and retie the bundles, and this speaks very highly for both producers and inspectors."

The comparison of work performed under the Fish Inspection Act for the past three years is as follows:—

	1937	1936	1935
Educational visits.....	3,797	3,542	1,991
Inspection of premises.....	3,943	4,059	2,416
Inspection of empty containers.....	348,055	384,318	465,743
Inspection of pickled alewives.....	11,242	7,815	8,325
Inspection of pickled herring.....	6,278 x	11,334 x	16,781 x
	5,867 y	9,317 y	14,020 y
	24 f	38 f	34 f
	6,791 p	4,902 p	4,618 p
Inspection of pickled mackerel.....	41,263 x	43,987 x	40,384 x
	327 y	491 y	245 y
		12 f	
	130 p	149 p	44 p
Inspection of smoked herring.....	226,555 b	228,401 b	376,185 b
Inspection of oysters.....	17,119 x	17,168 x	17,763 x
	2,487xx	2,638xx	3,022xx
Inspection of dry pollock, pounds.....	1,811,750		
Inspection of dry cod, pounds.....	837,000		
Inspection of frozen smelts.....	7,481 z		
Total number of inspections of containers and fish.....	5,577		

(x—barrels). (y—half-barrels). (f—quarter-barrels). (p—pails). (b—18-pound boxes).
(xx—1½-1¼ or 1 bushel boxes). (z—15 pound boxes).

ILLEGAL FISHING

Reference was made in the last annual report of this division to the difficult lobster protective problem that existed in the gulf and particularly in the spring fishing districts adjacent to the boundaries of the fall fishing and on the north side of Prince Edward Island. It is with a great deal of gratification that it now can be said with confidence that conditions with respect to illegal lobster fishing were very greatly improved during 1937. It is a fact that it was made impossible for those so inclined to carry on illegal operations successfully on any commercial scale whatever. This was due, in the first place, to the public exposure of conditions existing in 1936 and for many years prior to that time, that was made by the Royal Commission authorized to investigate illegal fishing in these districts during the winter and spring of 1937. Another important factor was the change in regulations which moved the northern boundary of the late season northwards from the Chockpish-Carey point line to the Eel river-North Point location. This greatly reduced the length of coast that is vulnerable to illegal operations. It was thus made possible to concentrate the protective forces in a smaller area during the summer and fall months and this was done, with most effective results. A new system of protection in the form of "flying patrols" was established—that is, two men with a car and camping outfit, who could be used when and where required. Six of these patrols were authorized, five in New Brunswick and one in Prince Edward Island. The water patrol service was also more efficient than in the past and with the proper co-ordination of land and water forces, most effective protection was realized, notwithstanding the fact that economic conditions among the shore fishing population had not improved.

Speaking of the division generally, it can be said that the regulations were very well observed during the year, but this required the constant vigilance of the forces available for this purpose, as will be observed by the following list of prosecutions and confiscations:—

	Prosecutions	Confiscations
Nova Scotia.....	106	308
New Brunswick.....	108	297
Prince Edward Island.....	103	56
Magdalen Islands.....	1	5
	<hr/> 318	<hr/> 666

REDUCTION OF FISH WASTE AND COARSE FISH

Eleven reduction plants operated during the year, eight in Nova Scotia and three on the Bay of Fundy coast of New Brunswick.

The following quantity of fish meal and oil was produced:—

		Value
Fish meal	6,775 tons	\$318,715
Cod oil	3,245 gallons	1,934
Medicinal oil	27,397 "	14,838
Fish oil	1,790 "	627
Gray fish oil	9,810 "	2,943
Herring oil	16,605 "	1,848
Blubber oil	8,505 "	378
Total oil	67,352 "	22,565

(The figures include the production of firms operating fish reduction plants and do not represent the total quantity of oil produced in the division.)

LOSS OF LIFE

It is with much regret that a loss of 26 fishermen is reported during the year. Of these nineteen were from Nova Scotia, two from New Brunswick, four from Prince Edward Island and one was from the Magdalen Islands.

LOSS OF GEAR

The estimated value of the fishing equipment destroyed by accident and storms during the year is \$116,000, including one fishing vessel and one scallop boat. The steam trawler *Lemberg* was also lost on Sable Island bank during September. The estimated loss was \$100,000, but fortunately there was no loss of life.

SEAL BOUNTY

The payment of bounty on hair seals, which was resumed in 1936, was continued during 1937 and the rate was increased from \$1.50 to \$2.50 per snout in order to encourage the fishermen to kill these animals which are so destructive to the salmon and other inshore fisheries. The comparative results for the two years are as follows:—

	1937		1936	
	Claims	Amount	Claims	Amount
		\$ cts.		\$ cts.
Nova Scotia.....	2,337	5,842 50	1,714	2,571 00
New Brunswick.....	642	1,605 00	290	435 00
Prince Edward Island and Magdalen Islands.....	869	2,172 50	149	223 50
	<hr/> 3,848	<hr/> 9,620 00	<hr/> 2,153	<hr/> 3,229 50

COLLECTION SERVICES

The usual bait collection service was operated in the Canso area, commencing on July 13 and terminating on September 15. A total of 40,315 pounds of bait was collected and distributed to the local fishermen who need this service, as there has been no supply of frozen bait at Canso.

An effort was also made to encourage the fishermen of Eastern Guysboro and Richmond counties to destroy dogfish by assisting in the transportation of such fish from the outports to Canso where they were used for reduction purposes. A collection service was inaugurated early in August and the boat kept in operation until September 18. Results, however, proved disappointing, as a total of only 250 tons was transported during that period. For some peculiar reason, these fish which are usually so numerous and destructive and regarded as a pest by the line fishermen were not caught in quantities when the service was in operation.

CO-OPERATION

The supervisors generally report that they and their officers are receiving splendid co-operation from the Royal Canadian Mounted Police and provincial officials, county and provincial fish and game protective associations and guides in connection with their administrative and protective duties. One supervisor reports in this regard as follows:—

"The co-operation of the Fish and Game Association members has been a considerable factor in the enforcement of the regulations as far as game fish are concerned, and the officers of the Mounted Police have been most helpful at all times when asked to assist. Perhaps enough credit has not been given to the members of this force in curbing illegal fishing, as they have always been alert to apprehend such offences and the mere fact of their making patrols at all times during day and night has contributed to a large extent to bettering conditions in this district."

It is pleasing to know that these relations exist and are proving mutually satisfactory. It is also desired to refer to the splendid work of the fishery advisory councils appointed on the Miramichi and Saint John systems to act in a consultative capacity with regard to the administration of the salmon and other fisheries of these rivers. These bodies are composed of representatives of each of the different fishing interests on the rivers and meet with the officers once or twice a year for consultation. The members serve without remuneration and their assistance and advice has been most helpful in dealing with numerous difficult questions.

FISHING FLEETS

The Lunenburg salt fishing fleet had a more successful season than for a number of years. The usual three trips were made to the banks and a total catch of 104,150 quintals was produced, which was greater by 24,500 quintals than the 1936 catch. Twenty-nine vessels engaged in this fishing as compared with twenty-five in the previous year. Following is a comparison of the catches of the different trips with those of 1936:—

Trip	1937		1936	
Frozen baiting.....	13 vessels—	6,900 qtls.	12 vessels—	6,900 qtls.
Spring.....	24 " "	28,250 "	19 " "	17,200 "
Summer.....	29 " "	69,000 "	25 " "	55,550 "
	Total.....	104,150 "		79,650 "

Price ranges of from 4.75-5.60 were somewhat higher for the frozen baiting trip but slightly lower for the spring and summer trips than those paid in 1936.

Fresh Fishing.—The heavy powered fishing vessels of the larger type continued their operations in the fresh fish industry during the fall and winter months. Most of these vessels hail from Lunenburg and land their fares there and at Halifax, Lockeport, Shelburne and North Sydney. Two new vessels were added to the fleet during the year, the *Harry W. Adams*, Lunenburg, and the *Robertson*, Shelburne.

The larger powered vessels operating in the fresh fish industry during the winter and fall months included the following: *Bluenose*, *E. F. Zwicker*, *Howard Donald*, *Irene Mary*, *Pasadena II*, *Robert J. Knickle*, *Sir Ernest Petter*, *Arthur J. Lynn*, *Archie F. MacKenzie*, *Dot and Hellie*, *Francis D. Roue*, *Marion and Emily*, *Spindler*, *Lucille M.*, *Mahaska*, *Andrava*, *Bessemer*, *Cachalot*, *Haligonian*, *Marguerite B. Tanner*, *Muriel Isabel*, *R. B. Bennett*, *Ronald George*, *Marjorie and Dorothy*, *Kristine M.*, *Douglass and Robert*, *Julie Opp II*, *Optiza*, *Lister*, *Leah Beryl*, *Silver Arrow*, *Marshall Frank*, *Jean and Shirley*, and *Harry W. Adams*.

During the usual Christmas lay-up, when the fresh fishing fleet was at the home port of Lunenburg, a demand was made by the fishermen, through their organization, under the fishermen's Federation, for higher prices. This resulted in a tie-up of the fleet for a period of about one month, when a temporary agreement was reached with the dealers and the fleet sailed again for the fishing banks on January 19.

It is regrettable to have to report that the condition of the Caraquet and Lamèque codfishing fleets in Gloucester county, New Brunswick, is less satisfactory from year to year. These fleets are composed of sailing vessels, mostly without power, of from ten to forty tons each. They engage in codfishing off the east coast of New Brunswick and off Prince Edward Island but some of the larger ones fish on Orphan and Bradley banks. The vessels generally sail for the fishing grounds during the last week of May and continue until the middle of November. From the first of the season until about September 15 they land their fares each week and after that they land every two weeks as the weather is then cooler. During the past year 162 vessels operated, employing 552 men. Much of their equipment is old and inefficient and compares poorly with that of some years ago, when market conditions for the particular cure of codfish that is made on the Gloucester shore were more favourable and the economic condition of the fishermen much more satisfactory. For example, in 1926, 212 vessels operated, employing 850 men. During that year the fleets produced about 15,000,000 pounds of codfish, while in 1937 the catch was less than half of that quantity. The loss of the Italian market for dried codfish has been keenly felt by the fishermen of Gloucester county but under the deplorable economic conditions that exist in the north-eastern portion of that country, it is improbable that there could be any appreciable increase in production until the whole industry is thoroughly reorganized, old methods abolished and new equipment and new marketing outlets provided to enable the fishermen there to operate economically and efficiently.

There was little change in the large salmon drift-net fleet of 189 boats. Some slight improvement was noted in the catch but this branch of the fisheries has been very much over-manned and with a declining catch for the past few years, operations have not been profitable to the fishermen.

SCALLOP INVESTIGATION

In view of the pressing demands, supported by some evidence, that a commercial scallop fishery might be developed off the Prince Edward Island

coast, arrangements were made to carry out further investigations there during the summer. A suitable scallop dragger of the type used in the off-shore fishery at Digby and equipped with seven drags and manned by a sufficient crew was engaged and operated along the east, north and west coast of Prince Edward Island from August 11 to September 27. While the ground was carefully covered no evidence that scallops could be found in commercial quantities was obtained.

EDUCATIONAL WORK

As will be noted by the report on fish inspection, numerous educational visits were made by the different inspectors in connection with their regular inspection duties. On these visits the fishermen and employees of fish curing establishments were advised as to the proper methods of curing and packing fish, particularly those varieties coming under the inspection regulations, such as salt herring, mackerel and alewives, oysters, smelts and smoked herring. Instruction was also given as to the sanitation and general cleanliness of fish packing sheds and other premises used in the fisheries. The inspectors' reports clearly indicate the extent of this work and refer to the various meetings held with the fishermen throughout the shore communities and the assistance given to canners, coopers and others engaged in the industry.

Another phase of the fish work is in the sport fishing field and reference is made to the wide distribution of the coloured departmental poster "Be a Good Sport" which was made by the inspectors with the active assistance of fish and game protective associations throughout the division during the year. This poster explains how young salmon and trout may be distinguished and the care that should be taken in liberating these small fish if they are caught.

During the latter part of 1936, under an arrangement with the Extension Department of St. Francis Xavier University, trained workers carried on adult education in various fishing communities. This work was concentrated on the north-east coast of New Brunswick. Rapid progress was made which showed active results during the following year in the formation of study clubs, credit unions and fishermen's co-operative enterprises in this district.

DEPARTMENTAL STAFF

During the year there were few changes in the permanent staff of this division. It is, however, with great regret that the death of Captain Clement Barkhouse, senior captain in the protection service on the Atlantic coast is reported. After a short period of illness Captain Barkhouse died on May 6 at the age of 71. Inspector H. E. Scott, of Kings county, was obliged to retire from the service on account of ill health. He was succeeded by Forest Watson, of Hall's Harbour, who received his appointment as inspector of fisheries on September 15. Inspector J. U. LeBlanc, of Westmorland county, resigned from the service on December 31.

Below is given a statement showing particulars of those employed within the division in the various branches of the service during 1937:—

District Supervisors.	9
Inspectors and clerical staff.	82
Guardians.	584
Patrol and protection service.	100
	<hr/>
	775

ANNUAL REPORT OF CHIEF SUPERVISOR OF FISHERIES, MAJOR
J. A. MOTHERWELL, WESTERN DIVISION (BRITISH COLUMBIA)
FOR 1937

In 1937 the total pack of all varieties of canned salmon was 1,509,175 cases, which is a good average and can be considered as quite satisfactory, notwithstanding the fact that for some reason not yet clear the run of cohoes was "short." As a matter of fact, the cohoes were "short" not only in British Columbia waters but all along the Pacific coast, including the Alaska, Washington, and Oregon areas.

Following are the five-year averages of total packs of all varieties of salmon in British Columbia in the past 15-year period:—

1923-1927.. . . .	1,647,090 cases
1928-1932.. . . .	1,484,861 "
1933-1937.. . . .	1,553,444 "

SOCKEYE

The sockeye pack of 325,774 cases, compared with the last five-year average of 345,446 cases, can be considered satisfactory, particularly in view of the additional precautions taken in recent years for the purpose of providing an adequate escapement to the spawning grounds.

The 5-year sockeye pack averages, for the whole province, during the past fifteen years, are as follow:—

1923-1927.. . . .	348,383 cases
1928-1932.. . . .	307,669 "
1933-1937.. . . .	345,446 "

Naas River Area.—The total pack of 17,590 cases taken from the run proceeding to the Naas in 1937 compares with 15,138 cases in 1932 and 10,173 cases in 1933, showing a very satisfactory increase over both brood years of the four and five-year cycles. The spawning ground conditions were found to be satisfactory.

Skeena River Area.—The total of 41,023 cases is the smallest for the Skeena area since 1933, and is the result of the seeding during the years 1932 and 1933. In these years the Skeena pack was 52,624 and 27,693 cases, respectively, and having in mind the fact that the runs of the two brood years were so small, and that the lower boundary on the Skeena was maintained at the new position much farther towards the mouth of the river in 1937, this year's pack cannot be considered discouraging. The spawning beds were well seeded, which shows that the unusual measures taken for the purpose of securing an increased escapement are bringing results.

Another factor which probably had its effect on the pack was the smaller number of boats fishing—856, as compared with 970 in the previous year, 1,119 in 1932, and 1,218 in 1933. This curtailment was a voluntary step on the part of the industry. It is also to be noted that the date of commencing sockeye fishing was ten days later than in the brood years of 1932 and 1933.

Rivers and Smiths Inlets.—The production of 108,170 cases in this area compares with 86,110 cases in the 5-year cycle brood year of 1932 and 119,548 cases in the 4-year cycle brood year of 1933, and can be considered as satisfactory. The spawning grounds were well seeded.

Fraser River Area.—The pack of 66,583 cases from fish actually caught in this area compared with 53,481 cases in the brood year 1933. It is interesting to remember, however, that the catches of sockeye in Johnstone straits were unusually good. This was the result of more intensive seining operations in

the straits area. These operations undoubtedly intercept, to some extent at any rate, sockeye salmon proceeding to the Fraser river. Such catch is not credited to the Fraser River area.

The period under review, 1937, was the cycle year in what were previously known as the "big run" years but the quantity of salmon proceeding to the spawning grounds frequented in the previous "big run" seasons did not indicate any increase over the runs of average in-between years.

Statement No. 15, showing the pack of sockeye salmon caught at or en route to the Fraser river, shows a total of 132,994 cases, from salmon caught at the Fraser river, the Canadian traps in Juan de Fuca straits, and in Puget Sound waters. This, again, does not tell the whole story, as there is no information as to what proportion of the runs using the Johnstone Straits approach are Fraser River fish.

COHOES

The coho pack of 113,972 cases is less than the average output during the past five years by 61,158 cases. This was due to a "short" run of this species of salmon but, as already noted, the lessened size of the run was not peculiar to British Columbia alone but was observable all along the Pacific coast. It cannot be a case of depletion as the intensity of fishing for cohoes in British Columbia of recent years and the condition of the spawning grounds have not justified any apprehension as to future runs.

The following statement shows the 5-year average packs of cohoes in the province during the past fifteen years:—

1923-1927..	148,018 cases
1928-1932..	142,157 "
1933-1937..	175,130 "

PINKS

Production of canned pinks, 585,576 cases, is an increase of 70,610 cases over that put up in the brood year 1935. The showing is very satisfactory.

This was the year of the big pink run to the Fraser River district, and the Jervis Inlet area. It is significant that the pack from the Fraser River district canneries was 87,897 cases, compared with 111,328 cases in the brood year of 1935. This condition was undoubtedly brought about by the greater intensity of salmon purse-seining in Johnstone straits. This seining is now taking an increased toll of salmon proceeding to the Fraser, and, incidentally, catching the fish when they are in a superior condition for canning purposes.

The 2-year average packs of pinks during the past fourteen years have been as follows:—

1924-1925..	551,480 cases
1926-1927..	510,305
1928-1929..	635,165 "
1930-1931..	659,466 "
1932-1933..	378,137 "
1934-1935..	475,165 "
1936-1937..	588,554 "

CHUMS

Chum pack, totalling 447,602 cases, reached a very good average size. The average for the last five years was 452,301 cases.

The following statement shows the 5-year average pack during the past fifteen years:—

1923-1927..	572,105 cases
1928-1932..	410,422 "
1933-1937..	452,301 "

VARIATIONS IN SALMON SIZE

It is interesting to note the difference in size of the sockeye salmon in the several areas. Particulars are shown in the following statement of the number of fish required in each of the most important districts to fill a standard case of forty-eight one-pound tall cans, or its equivalent, during the season of 1937:—

Area	No. of Sockeye per case canned
Naas river.....	12.24
Skeena river.....	13.58
Rivers inlet.....	14.04
Smiths inlet.....	11.72
Bella Coola.....	16.11
Butedale.....	16.60
Fraser river.....	13.50

CANNED SALMON INSPECTION

The following statements give statistics of canned inspections made during the calendar year by the Canned Salmon Inspection Laboratory operated by the department in British Columbia:—

Number of inspections made.....	3,095
Total number of cases inspected.....	1,635,720½
Total number of cases below certificate standard.....	29,950½
Total number of cases available for certificates.....	1,605,770

DETAILS OF CANNED SALMON INSPECTION ACCORDING TO SPECIES

Species	Number of cases inspected	Number of cases below certificate standard	Number of cases eligible for certificates
Sockeye.....	344,730	4,747½	339,982½
Springs.....	18,628		18,628
Steelheads.....	838½		838½
Bluebacks.....	19,265½	145	19,120½
Cohoe.....	117,790	168½	117,621½
Pinks.....	606,688	23,912½	582,775½
Chums.....	527,780½	977	526,803½
Totals.....	1,635,720½	29,950½	1,605,770

PARTICULARS OF NON-CERTIFIED CANNED SALMON ACCORDING TO SPECIES

Species	Below Grade B	Grade B	Tips and Tails	Totals
Sockeye.....		1,549½	3,198	4,747½
Springs.....				
Steelheads.....				
Bluebacks.....			145	145
Cohoe.....	8	65½	95	168½
Pinks.....		23,912½		23,912½
Chums.....		977		977
Totals.....	8	26,504½	3,438	29,950½

The report of the Chief Chemist, Mr. F. Charnley, as to operations of the Inspection Laboratory, will be found further on in this report. (Appendix No. 5.)

The inspection fees collected totalled \$8,148.86, which represents one-half cent per case charged on all salmon inspected.

DEPARTMENT OF FISHERIES

CANNED SALMON, FRENCH QUOTA

Under agreement with the French authorities the quota of Canadian canned salmon permitted to be landed in France during the year under the preferred tariff totalled 38,750 metric quintals, or 8,542,825 pounds. In the preceding year the quota was 35,000 metric quintals, equalling 7,700,000 pounds.

As usual, Certificates of Origin in the case of all shipments were supplied from the office of the Chief Supervisor at Vancouver.

DRYSALTED SALMON

The British Columbia Salt Fish Board was again the marketing medium for the salmon drysalters and allotted among the twenty-six plants 29,800 boxes, having a net weight of 440 pounds each. The actual quantity shipped, however, only reached a total of 22,843 boxes. The shipments were marketed in the Orient as usual.

The following statement shows the pack of drysalted salmon, by species, since 1925:—

—	Sockeye	White Springs	Cohoos	Pinks	Chums	Totals
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
1925.....		4,580		2,137	131,737	138,454
1926.....					139,858	139,858
1927.....					81,170	81,170
1928.....			48		170,205	170,253
1929.....					77,362	77,362
1930.....				1,291	114,932	116,223
1931.....	520	9,743	4	40,371	336,055	386,693
1932.....		8,142			119,147	127,289
1933.....		89		7,469	75,317	82,875
1934.....			2		90,979	90,981
1935.....	4	1,354	34	6,173	139,076	146,641
1936.....		2,780		76	150,637	153,493
1937.....				1,292	107,691	108,983

SALMON TROLLING

The only varieties of salmon taken by means of the troll, apart from a very few pinks and an odd sockeye or chum, are the springs, bluebacks and mature cohoes. As they are mostly caught in the open salt waters, well away from the mouths of streams, they are in the very best of condition when taken and are in much demand for the purposes of the fresh fish market and cold storage.

The number of boats employed in trolling has increased from 1,821 in 1925 to 3,162 in 1937.

The operations are conducted largely off the west coast of Vancouver island, extending off the shores of the island as far as forty miles at times, in the gulf of Georgia, in the Alert Bay-Bull Harbour district, Dixon entrance, and around the Queen Charlotte and Dundas islands. Some trollers are to be found in the vicinity of Millbank sound and Goose islands.

Although some of the trollers have large, well-equipped boats and are able to go long distances, the great majority of the boats are of a class which cannot operate far from shore; thus they are not in a position to operate to advantage in extra-territorial waters off British Columbia. Larger and more powerful craft could take a greater percentage of the runs of springs and cohoes which are to be found off the shores of the province.

As a result of the large increase in the number of salmon trolling boats, particularly in the outside areas, a smaller percentage of the runs now reaches the fishermen in the inside waters between Vancouver Island and the mainland.

This condition has recently been the subject of complaint by some of the trollers who operate in the inside waters and find that they have not available to them such quantities of salmon as came within their reach prior to the great increase in the number of fishermen who operate outside.

POWER BOATS IN SALMON GILLNET FISHING

Statement No. 14 shows a reduction of 216 in the number of power boats used in salmon gillnetting in District No. 2 as compared with the number in use in the preceding season. There was a reduction of 548 in the total number of all varieties of salmon gillnet boats operating in the same district.

Statement No. 20 gives the number of power boats used by whites, Indians, and fishermen of Oriental extraction.

SALMON TAKEN BY INDIANS IN THE FRASER RIVER WATERSHED FOR PURPOSES OF THEIR OWN FOOD REQUIREMENTS

The following statement as to salmon taken by Indians in the Fraser River watershed for their own food purposes will be found of interest in view of the fact that the International Pacific Salmon Fisheries Commission is now functioning and is concerned with the sockeye of the Fraser:—

Fraser River	Sockeye	Springs	Cohoos	Pinks	Chums	Total
Prince George subdistrict.....	4,405	550				4,955
Quesnel sub-district.....	10,430	383				10,813
Kamloops sub-district.....	3,010	610	100			3,720
Hope sub-district.....	1,750	2,550	965	350	50	5,665
Harrison Lake sub-district.....	1,975	1,255	2,133	2,765	4,029	12,157
Pemberton sub-district.....	9,760	850	600			11,210
Chilliwack patrol area.....	4,680	900	2,705	2,530	5,160	15,975
Totals.....	36,010	7,098	6,503	5,645	9,239	64,495

HALIBUT

Landings of halibut at British Columbia ports by Canadian and United States vessels during the year totalled 187,425 hundredweights, which is the largest since 1930. The following table shows Canadian and United States landings, combined, at British Columbia ports annually since 1930:—

Year	Vancouver and New Westminster	Prince Rupert	Butedale	Vancouver Island Points	Totals
	cwts.	cwts.	cwts.	cwts.	cwts.
1930.....	11,387	293,617	978	2,814	254,796
1931.....	8,498	167,757	3,627	2,123	182,005
1932.....	11,883	148,615	6,677	1,672	168,847
1933.....	13,436	144,065	10,431	2,440	170,372
1934.....	16,113	150,476	13,297	2,716	182,602
1935.....	22,351	129,586	15,713	3,493	171,143
1936.....	20,777	131,830	11,522	3,992	168,121
1937.....	23,334	147,638	12,676	3,777	187,425

Of the total 1937 landings, 117,212 hundredweights were from Canadian vessels and 70,213 from United States vessels.

HALIBUT LIVER PRODUCTION

The year again shows a very considerable increase in the quantity of halibut livers landed at British Columbia ports, the total being 3,105 hundredweights, as compared with 1,916 hundredweights during the previous year.

The average price per pound was 51.61 cents, as against 50.27 cents in the previous year and 20.05 cents in 1933.

COD LIVERS

The landings of cod livers (black cod and ling cod) by Canadian vessels during the year was 1,017 hundredweights, and the following table shows landings and value for each of the years 1933 to 1937:—

Year	Cwts.	Marketed value	Average value per cwt.
		\$	\$
1933.....	385	7,781	20.21
1934.....	825	16,772	20.33
1935.....	1,127	43,367	38.44
1936.....	1,430	59,654	41.71
1937.....	1,017	40,238	39.56

GRAYFISH LIVERS

During the year the fishermen have found an increasing demand for the livers of the grayfish or dogfish. In fact, the demand has been so attractive that fishermen will operate even at points distant from collecting facilities for reduction plants in order that they can obtain the livers, which are exported to the United States and there processed. Fishermen have found the liver collection profitable, notwithstanding that in some areas they cannot market the whole fish but simply remove the livers, throwing the bodies away.

HERRING

In the main herring areas fishing operations were controlled by catch limits. This system appeared to work very well. It also serves as a safeguard against possible reduction in herring stocks, pending receipt of some conclusive report from the Fisheries Research Board which is at present surveying the whole herring situation.

Herring seiners again prospected the northern areas and with considerable success. The main northern supplies were obtained from Cousins inlet, Prince Rupert harbour, Rivers inlet, and some smaller areas between Smiths inlet and Prince Rupert. It is believed that further extension of the northern activities will disclose other valuable sources of herring supplies.

The quantities of herring in the older fishing areas on the east and west coasts of Vancouver island were again found to be satisfactory. Fishing operations were of lessened intensiveness, however, as those associated with reduction and drysalting operations pooled their interests in the actual fishing, with the result that in the east coast area, for instance, only four herring seines were in operation in stead of an average of 9.6 in recent years.

DRYSALTED HERRING

Statement No. 8 shows the production of drysalted herring since 1918. It will be seen that the pack during the year under review was 203,401 hundred-weights as compared with 383,337 hundredweights during the previous year; the 1937 pack, in fact, was the smallest since 1918. Curtailment is due to the present difficult marketing conditions in China. Marketing operations were again conducted under the British Columbia Salt Fish Board, which allotted a quota of 50,000 boxes among five operators. Actually there were shipped to the Orient 51,274 boxes, five boxes equalling one ton.

PILCHARDS

When pilchards were first discovered in any appreciable quantities off the coast of British Columbia they were taken in the bays and inlets off the west coast of Vancouver island, and fishing operations were confined to the quiet waters of the inlets at a reasonable distance from the plants. As the fishery developed, it was found that larger boats and stronger and bigger gear were necessary to pursue fishing farther out into the ocean as the habits of pilchards are so variable. In some seasons much time is lost hunting for the schools, and it sometimes happens, for instance in 1937, that the main runs do not come near to the British Columbia-operated plants. As a matter of fact, in 1937 practically all the pilchards landed in the province were taken in extra-territorial waters to the south. This meant, of course, a long haul to the plants, and contributed to the extra cost of manufacture.

Statement No. 9 gives the quantity of pilchards canned, and Statement No. 10 shows the amount of oil and meal produced by the pilchard reduction plants.

CLAMS

A further small increase in the clam landings occurred during the year. This applied to both clams marketed fresh and the canned product.

Exports to the United States of freshly caught clams were again a considerable factor in the business but there is a prospect that local canning operations will be extended in the future. One of the larger companies in the fishing industry of the province is contemplating entering the clam canning field.

The quantities of clams marketed fresh and canned each year since 1934 are shown in the following statement:—

Year	Marketed Fresh	Canned
	bbls.	cases
1934.....	3,166	5,815
1935.....	7,858	10,209
1936.....	13,265	12,579
1937.....	13,552	12,587

CRABS

Most of the crabs marketed fresh are taken in the vicinity of the larger centres such as Boundary bay and Vancouver harbour, in the vicinity of Vancouver, and in Naden harbour, Queen Charlotte islands, for the purposes of the Prince Rupert market, although smaller quantities are available close to the latter city itself. The only canning operations of any importance are those which have been conducted in recent years at Naden harbour, although a start was made during this year at Prince Rupert. The pack of canned crabs has been steadily increasing in recent years and is of a high quality.

The following statement shows the disposition made of the catch in recent years:—

	Marketed Fresh	Canned
	cwts.	cases
1928.....	5,878	.....
1929.....	5,496	671
1930.....	4,459	295
1931.....	4,968	204
1932.....	2,952	251
1933.....	3,766	999
1934.....	3,187	1,267
1935.....	4,336	1,322
1936.....	4,347	1,312
1937.....	4,948	1,546

WHALES

The boats of the two whaling stations located at Naden harbour and Rose harbour, on the Queen Charlotte Islands, captured 317 whales during the year or 61 less than in 1936.

The decrease in the number of whales taken in 1937 was due to unfavourable weather conditions, and also to the fact that one boat less than usual was employed.

Statement No. 11 shows the whale catch since 1922.

FUR SEAL SKINS

Statement No. 12 shows an increase of 783 in the number of fur seals taken. The increase is the result of higher prices being offered for the skins than in 1936. Weather conditions were also a factor in the increase; under the Pelagic Sealing Treaty, 1911, no boats are permitted in the seal hunting operations other than canoes manned by Indians, and, obviously, favourable weather makes for more hunting.

BRITISH COLUMBIA MARKETING BOARDS

Under the federal Natural Products Marketing Act the following marketing boards were established in the province several years ago: British Columbia Salt Fish Board and the Halibut Marketing Board of British Columbia. On the Act being found ultra vires the British Columbia authorities, under date of August 25, 1937, set up the following market schemes under the Natural Products Marketing (British Columbia) Act: (1) Scheme to control the marketing of dry salt herring and dry salt salmon produced in the province of British Columbia; (2) scheme to control and regulate the transportation and marketing of halibut in British Columbia.

DESTRUCTION OF SEA LIONS

With a view to safeguarding the salmon fishery against depredations of sea lions in a wide area, the hunting of the lions by departmental officers was extended somewhat during the year. In addition to the usual annual hunting by the crew of C.G.S. *Givenchy*, in the vicinity of the Pearl and Virgin rocks and Haycock Islands, the crews of the *Malaspina* and *Givenchy*, as well as those of several of the smaller departmental boats were instructed to endeavour, during the course of their patrols along the coast, to reduce the numbers of sea lions on the west coast of Vancouver island, at Nanoose bay on the east coast

of the island, and in waters north of Queen Charlotte sound where these mammals were reported to collect in considerable numbers and interfere with the operations of the fishermen. Unless weather conditions are very favourable it is not possible to land at exposed points, and this fact, together with the short season during which sea lions gather in any numbers on the rookeries, made it impossible to accomplish much in the northerly area, although some good work was done in the Barclay Sound and Nanoose Bay districts where sea lions have in recent years been found to interfere seriously with the fishermen's operations.

The following statement shows the results of the year's sea lion hunting:—

Where destroyed	Adults	Pups
Barclay Sound area.....	94	.....
Nanoose bay.....	32	.....
Solander islands.....	165	.....
Virgin rocks.....	95	62
East Haycock islands.....	1,633	428
Pearl rocks.....	24	.....
Totals.....	2,043	490

BOUNTY ON HAIR SEALS

Bounty was again paid on the destruction of hair seals in British Columbia waters. The total paid for this purpose during the fiscal year 1937-38 was \$10,737.50. The following statement shows hair seal bounty payments in British Columbia from 1914-15 onward:—

Fiscal Year	Rate	Hair Seals	
		Number	Amount
	\$ cts.		\$ cts.
1914-1915.....	3 50	2,237	7,829 50
1915-1916.....	1 00	749	749 00
1916-1917.....	1 00	785	785 00
1917-1918.....	1 00	748	748 00
1927-1928.....	3 50	567	1,984 50
1928-1929.....	3 50	3,209	11,231 50
1929-1930.....	2 50	5,944	14,860 00
1930-1931.....	2 50	6,308	15,770 00
1931-1932.....	2 50	6,084	15,210 00
1932-1933.....	2 00	4,300	8,600 00
1933-1934.....	1 50	400	600 00
1936-1937.....	1 50	1,933	2,899 50
1937-38.....	2 50	4,295	10,737 50
Totals.....		37,559	92,004 50

FISHERIES DISPUTES

It is gratifying to be able to report that during the year fishing operations were not marred by strikes which in some seasons have been the cause of turning what should have been profitable operations into rather disastrous ones financially.

ENGINEERING WORK

In Appendix No. 6 of this report will be found reference to the work which engaged the attention of the engineering branch of the department's British Columbia service during the year.

DEPARTMENT OF FISHERIES

VIOLATIONS

The statement given below shows an increase of \$595.03 in the total amount collected during the year from fines and sales resulting from violations of fisheries laws and regulations:—

	District No. 1	District No. 2	District No. 3	Total
Prosecutions.....	74	45	79	198
Fines.....	\$ 509 00	1,461 00	963 00	2,933 00
Sales.....	53 95	726 74	826 09	1,606 78
Total fines and sales.....	\$ 562 95	2,187 74	1,789 09	4,539 78

PATROL SERVICE

There were 21 departmentally owned boats in commission for patrol purposes in 1937 as well as 90 chartered power boats, and 12 row boats, and, in addition, two seaplanes, as shown by the following statement:—

1937	Number	Total
<i>Departmentally owned—</i>		
<i>Malaspina and Givenchy (steam).....</i>	2	
District No. 1 (gas and diesel).....	5	
District No. 2 (gas and diesel).....	10	
District No. 3 (gas and diesel).....	4	21
<i>Chartered boats—</i>		
District No. 1 (gas and diesel).....	5	
District No. 2 (gas and diesel).....	29	
District No. 3 (gas and diesel).....	56	
District No. 1 (row).....		
District No. 2 (row).....	1	
District No. 3 (row).....	8	99
		120

The departmentally owned *Elk Horn*, operated on the Fraser river, has outlived its usefulness and was retired at the end of the year, to be replaced by a smaller type of boat designed particularly for river patrol.

Repairs to the departmentally owned boats at the Poplar Island station, New Westminster, have been somewhat handicapped during the past season owing to the freshets and ice in the river having destroyed the bridge from the mainland to the fisheries warehouse and having done other damage. Notwithstanding these handicaps, the usual repairs were made to the boats.

The C.G.S. *Malaspina* logged 22,993 miles during the year and the C.G.S. *Givenchy* 16,966 miles.

Patrol by means of seaplanes covered 257 hours 35 minutes during the year, as shown by the following statement, which also shows total flying time in other years:—

Base	Hours	Minutes
Alert Bay..	41	00
Nanaimo..	77	05
Swanson Bay..	139	30
	257	35

Year	Hours	Minutes
1927..	92	02
1928..	261	30
1929..	408	08
1930..	443	40
1931..	319	25
1932..	275	25
1933..	260	25
1934..	262	10
1935..	302	50
1936..	253	00

The effectiveness of the seaplane patrol was again demonstrated during the year. On one afternoon during the weekly closed season no fewer than fourteen salmon seiners were apprehended for fishing before the expiration of the closed time. In this particular case such a result could not have been obtained by means of ordinary surface patrol boats.

DEPARTMENTAL STAFF

The turning over to the provincial authorities on December 31, 1937, of the administration of the sport fish of the non-tidal waters, as well as the sport fish culture, resulted in a further reduction of staff in the department's British Columbia division.

Those employed during the year were as follows:—

Supervisors, inspectors, and clerical staff.....	59
General (inspection of spawning grounds, etc.).....	13
Guardians.....	37
Patrolmen and boat crews.....	210
Fish Culture.....	33
Removal of obstructions.....	42
Total.....	394

RETIREMENTS FROM SERVICE

The number of retirements from the permanent service in British Columbia during the year totalled 10, as shown by the following statement:—

Name	Rank	Years of Service
FISHERIES		
Hubert Walter Hunt.....	Assistant Engineer.....	18
George Norman Gartrell.....	Inspector.....	20
Charles Henry Robinson.....	Inspector.....	19
James Beattie Wood.....	Inspector.....	24
FISH CULTURE		
Alexander Robertson.....	Hatchery Superintendnet....	35
Frank Pells.....	Hatchery Assistant.....	7
Clarence Sayer.....	Hatchery Assistant.....	17
Arthur Percival Hills.....	Hatchery Superintendent....	18
Philip Byfield Stratton.....	Hatchery Assistant.....	12
Frank Albert Tingley.....	Hatchery Superintendent....	17

CO-OPERATIVE EFFORTS AMONGST FISHERMEN

Recent seasons have shown an increasing tendency on the part of the fishermen to join co-operatively for the purpose of marketing their catches and obtaining their supplies. At present the salmon trollers are quite well organized in several associations and appear to be successful. Through their efficient management they obtain the highest competitive prices and the fishermen have received sufficient encouragement to justify two of the co-operative trolling associations incurring very considerable expense in the purchase of highly efficient fish carrying vessels.

SPORT FISHERIES

Until the present year the sport fisheries in the non-tidal waters of the province, like the other fisheries, were administered by the federal department. Protective work was carried on and hatcheries were maintained to propagate sport fish. In 1933 the provincial authorities also entered the fish culture field with a view to assisting in the building up and maintenance of the valuable sport fisheries.

During 1937, following negotiations between the two federal and provincial governments, the fish cultural operations and protection work, in so far as the sport fish of the non-tidal waters are concerned, were transferred to the provincial authorities under Order in Council P.C. 2532 which was approved by His Excellency the Governor General on October 12th, 1937, and reads as follows:—

"The Committee of the Privy Council have had before them a report, dated September 28, 1937, from the Minister of Fisheries, submitting as follows:—

"While the administration of the fisheries in the non-tidal waters of the provinces and in Quebec in the waters that are above those that are navigable from the sea, is a Provincial responsibility, certain fish that are of commercial importance when they are in the tidal waters ascend to the non-tidal waters to reproduce and, while there, are valuable sport fishes. Hence the protection of these fish, even when they are in the non-tidal waters, and their increase by fish cultural activities are matters of Federal concern and hatcheries for the reproduction of such fish have been established in different provinces. To such extent as these hatcheries can also increase the supply of fresh-water sport fish without unduly interfering with the purpose for which they were established, they are so used.

"In British Columbia in years gone by, a number of hatcheries for the propagation of sockeye salmon were established. From time to time it was urged that these hatchery operations should be extended to include sport fish. As valuable sport fish in that province reproduce during the period of the year when the sockeye hatcheries would be closed for the season, the staffs thereof could largely be used to hatch sport fish if hatcheries at suitable places were available. Consequently, from time to time relatively inexpensive sport fish hatcheries were established as follows:—

Hatchery	Location	Description
Smiths Falls.. . . .	Cultus Lake, Vedder Crossing.. . . .	Buildings cheaply constructed. Built of logs and cedar shakes obtained in the vicinity.
Argenta-Lardo.	Argenta and Lardo on Kootenay Lake..	Argento—hatching troughs only covered during hatching season with temporary covering. Lardo—hatching troughs covered with roof supported on posts. Troughs below roof enclosed with wire netting.
Lloyd's Creek.. . . .	Lloyd's Creek, Kamloops.. . . .	Hatchery building and living quarters for staff. Buildings not suitable for winter use as season extends from late spring to mid-summer.
Penask Lake.. . . .	Penask Lake, Quilchena district.. . .	Hatchery building and living quarters not suitable for winter use. Season extends from late spring until mid-summer. Hatching troughs not enclosed but protected by roof supported on posts.
Summerland.. . . .	Summerland.. . . .	Stone building formerly the Summerland Power Station.
Fish Lake.. . . .	Fish Lake, Kamloops district.. . . .	Trap and retaining enclosures for parent fish; troughs in which to eye eggs before planting or transferring them to Lloyd's Creek Hatchery; no permanent buildings.
Beaver Lake.. . . .	Beaver Lake, Kelowna District.. . . .	Traps and retaining enclosures for adult fish; Hatching troughs provided with temporary seasonal covering; no permanent buildings.

"Also, a few years ago the Provincial Government undertook more actively to administer the sport fisheries of British Columbia and extended such activities to sport fish culture.

"Following the closing of the sockeye salmon hatcheries in the province at the end of last season, the situation became similar in British Columbia to that in other provinces where the propagation of sport fish is being left entirely to the Provincial authorities.

"In the light of the above and as dual Services are undesirable, the question was gone into with the Provincial Minister concerned—the Attorney General—who was informed that, subject to approval, if he were prepared to undertake full responsibility for sport fish development in the province the above listed hatcheries or any of them would be placed at the

disposal of the province following the end of the operating season of this year. He has now replied that the province feels that sport fish culture should be placed under Provincial jurisdiction entirely and that his department will examine the above hatcheries and will be glad to have an opportunity of taking over such of them as can be usefully utilized.

"In the circumstances, the minister, on the advice of the Deputy Minister of Fisheries, recommends:—

"(1) That the end of the hatching season of this year the Department of Fisheries shall discontinue sport fish hatching in British Columbia;

"(2) That such of the above listed hatcheries as the province may wish to utilize for hatchery purposes be transferred to the province without cost;

"(3) That should any of the above listed hatcheries not be so taken over they be disposed of to the best advantage.

"The Committee concur in the foregoing recommendations and submit the same for approval."

The actual transfer dated from December 31, 1937.

As the result of this transfer, four permanent fish cultural officers have been retired from the service in British Columbia and two fisheries inspectors who were employed in the protection of the sport fish.

There still, of course, remain in the jurisdiction of the federal authorities the valuable tidal sport fisheries which include the very popular salmon fishing in such districts as Campbell river, Comox, Qualicum, Cowichan, Victoria, and Howe sound. Salmon angling is becoming more popular each year, particularly as more publicity is given to the fact that the coho salmon will take the fly.

COARSE FISH DESTRUCTION

Following the departmental policy of eliminating coarse fish as far as possible from the waters frequented by sport varieties, 35,125 of the undesirable species were destroyed in 1937, as shown by the following statement:—

Area	Suckers	Squawfish	Carp	Total
<i>Okanagan</i>				
Okanagan Lake (outlet).....	189	25	788	1,002
Duck Lake (outlet).....	319	987	1,063	2,369
Woods Lake.....	2,130	38	500	2,668
Channel between Woods and Long Lakes.....	542	425	113	1,080
Long Lake (outlet).....	1,015	6	85	1,106
Otter Creek.....	2,230	715	14,613	17,558
<i>Kamloops</i>				
Monte Lake.....	9,342			9,342
Totals.....	15,767	2,196	17,162	35,125

SPORT FISH PROPAGATION

The departmental 1937 collections and distributions in the province of eggs and fry of the several varieties of sport fish were as follows:—

Species	Collections	Distributions	
		Eggs	Fry
Kamloops trout.....	8,387,580	4,700,600	3,140,389
Steelhead trout.....	253,000		255,110
Cutthroat trout.....	1,910,199	1,336,565	130,451
Eastern Brook trout.....			1,342
Kokanee.....			1,060,561
Totals.....	10,550,779	6,037,165	4,487,853

Following will be found particulars of the angling permits issued by the officers of the department, together with the amount of revenue received in the case of non-residents:—

	Number issued	Revenue
		\$ cts.
<i>District No. 1</i>		
Anglers' Permits (Daily).....	191	173 50
Anglers' Permits (Season).....	672	3,111 85
	863	3,285 35
<i>DISTRICT NO. 2—Nil</i>		
<i>DISTRICT NO. 3</i>		
Anglers' Permits (Daily).....	653	585 80
Anglers' Permits (Season).....	264	1,263 50
	917	1,849 30
<i>WHOLE PROVINCE—SUMMARY</i>		
Anglers' Permits (Daily).....	844	759 30
Anglers' Permits (Season).....	936	4,375 35
	1,780	5,134 65

REPORT ON SALMON SPAWNING GROUNDS, 1937

Conditions found on the salmon spawning grounds throughout the province may be regarded as generally satisfactory, save as regards coho salmon, and should justify expectations of good returns in the next cycle years.

Following is a detailed description of conditions found on the spawning grounds by the inspecting departmental officers:—

Queen Charlotte Islands

Sockeye are not a real factor in the supplies of salmon to this area, although there is a small run to Copper Bay, and to Massett inlet. This variety is used principally for food purposes by the Indians.

In the case of the cohoes the runs are always light and the year under review was no exception.

This was the "off" year in the case of pinks and the situation was comparable to other odd-numbered years.

The chum supply was an average one, with apparently a larger percentage passing safely to the spawning grounds.

Naas Area

On the whole the escapement of sockeye was found to be quite good, particularly that portion reaching the main spawning grounds in the Meziaden Lake district in the early part of the season. The Naas appears to be holding up well.

The upper reaches of this area are inaccessible and it is still felt that the cost and difficulties of a more comprehensive examination are not justified.

The fishway was found to be in good condition and the salmon have no difficulty in passing into the lake.

Quite a satisfactory supply of springs was found, similar to the run of the preceding season. A fairly heavy escapement of cohoes was observed in all the streams frequented by this variety, and the situation is considered satisfactory.

The pink run was quite light, and did not equal the small escapement of the brood year of 1935. The poor seedling cannot be attributed to the fishing operations on the Canadian side of the international boundary, at any rate, but it is

possible that part of the run was intercepted by fishing off the Alaskan shores. It is also observed that in some years, for no apparent reason, pinks seem to avoid streams usually frequented by them, and pass to other areas close by; for instance, in the year of a recent failure at Massett inlet there was an abnormally large run of pinks which reached the streams immediately to the north of the international boundary and came as a surprise to Alaskan authorities.

The Naas is not a large producer of chum salmon but the run of this variety was normal.

Skeena River

An excellent escapement of sockeye occurred to the principal spawning areas of Babine lake, Babine river, and Lakelse lake. Due to bad weather, real inspections of the Kispiox river and Morice lake systems had to be abandoned, but the catches of sockeye taken by the Indians at several points leading to these spawning grounds would appear to indicate a good escapement. A larger percentage than usual of the sockeye in the Babine area ascended to the spawning grounds. This condition was due to the fact that when haying was delayed by bad weather the Indians had lessened opportunity to fish and were therefore not able to take as large a toll of salmon as usual. Sickness among the Indians also affected their fishing operations.

The supply of springs was good, both at Babine river and at Ocstahl river.

The cohoes were also found to be reasonably plentiful, generally speaking, no doubt partly as the result of all fishing closing on September 25th.

The pink run was reported as heavy to the Babine River and Lakelse Lake areas, greater than the cycle year of 1935; in fact, the inspecting officer states that it was the largest he had observed since 1929.

The Skeena is not a heavy producing area in the case of chums. The escapement was normal.

Lowe Inlet

The sockeye supply was found to be quite good and better than in the brood year.

The coho escapement was light, for some reason not apparent.

This was an "off" year for pinks in this area but the supply was smaller than in 1935.

This area is quite a heavy producer of chum salmon and the escapement was even better than usual.

Butedale Area

Sockeye have not been a real factor in this area, except in Gardner canal. Spawning ground conditions were found to be normal.

The escapement of cohoes was only fair, and in this respect conditions here were similar to those in most areas along the Pacific coast.

The pink run and the escapement were disappointing in the northern portion of the district, but were somewhat better in the southern part. This district will be watched closely in the future.

The escapement of chums was fair, comparing favourably with escapement in recent years.

Bella Bella Area

Due to practically continuous rains during the sockeye run, the bulk of the supply passed safely to the spawning grounds and the seeding was satisfactory.

Coho supply was smaller than usual and cannot be regarded as particularly satisfactory.

The pink spawning was entirely satisfactory and comparable with the escapement of 1935, the brood year.

The chum escapement was quite heavy and the seeding very good.

Bella Coola Area

The inspecting officer reports that the season's supply of parent salmon on the spawning grounds of his area is entirely satisfactory. Adequate supplies were observed and spawning took place under most favourable conditions.

The sockeye areas of Kimsquit lake and Atnarko river were well supplied with spawners, the escapement to the former being quite equal to that of the brood year and the Atnarko supply considerably exceeding that of 1933. The inspector reports, however, that in the Atnarko area the number of undersized sockeye appears to be increasing from year to year. This year hundreds of fish were noticed that would not weigh over one pound, all apparently mature and spawning normally. These small fish evidently do not appear in the Kimsquit system.

The supply of springs was found to be quite good. Practically the whole run which reached the mouths of the rivers in this area passed safely up as they are not fished in the district to any extent.

The coho supply was found to be quite a good one as compared with recent years.

The numbers of pinks found on the spawning grounds are classed as very heavy, and better than the excellent run of 1935, the brood year.

The chum supply was also heavy, better than that of recent seasons.

Rivers Inlet Area

The inspecting officer, who has had considerable experience on the inlet, sums up the sockeye spawning conditions in this area by saying that he is well satisfied with the evidence of escapement.

The conditions on the spawning grounds are equal to those of 1935 and show improvement over those of 1932. The most satisfactory conditions were found in Genesi, Nookims, Dallec, Quap and Whonnock rivers.

The rivers at the head of the lake were somewhat disappointing, but not really poor, other than the Waukwash where there was a failure because of the diversion of the stream by a freshet.

There is usually a small run of spring salmon to the Waukwash but the spawning area in that stream is not now available; however, the springs no doubt spawned somewhere else.

The coho supply was light and similar to that in most other areas.

Rivers inlet is not an important area from the standpoint of pink salmon and most of the run escapes year after year to the spawning grounds unmolested. The same remarks apply in the case of chums. The scarcity is not the result of intensive fishing in the district.

Smith Inlet Area

Two inspections were made of this area and the escapement of sockeye was found to be good in the Geluck and rather poor in the Delabah river. There was still a supply of sockeye in the lake after the second inspection, which is not an unusual condition, but it is difficult to estimate just what the supplies were in the lake, compared with other years.

The conditions are not as satisfactory as hoped for and are no doubt influenced to some extent by the freshet conditions of 1932 from which the five-year run originated. It is felt that any reduction in the percentage of escaping fish is not due to overfishing and, in any event, the boundary of Quashela creek may be depended upon to allow of a good percentage of any run to pass safely to the spawning grounds.

The Delabah is the main spawning stream and apparently there was an adequate supply of spawning sockeye there.

A satisfactory supply of springs was found.

The cohoes, pinks and chums do not frequent the area in large numbers, but the supplies of the three species were normal.

Fraser River Watershed

Sockeye.—The season 1937 was of a cycle which years ago produced immense runs of the highest quality of sockeye salmon. Since 1913, however, as the result of the slide at Hell's Gate, and undoubtedly due in part also to intensive fishing, this run has dropped to proportions very similar to those of other years.

In 1936 there was an unexpectedly large return of sockeye to the Fraser, and this year has also been comparatively good. An encouraging feature of this satisfactory run in the last two years has been the fact that for some reason or other they did not remain at the mouth of the river for any considerable period but evidently finding conditions suitable passed without delay up to the spawning grounds.

A detailed report by areas is given below:—

Stuart Lake Area.—Whilst some 6,000 spawning sockeye were reported in this area, and this quantity was larger than seen for some seasons, including the brood year, the run cannot be considered as good when compared with those of the years previous to 1913. However, there would appear to be reason to believe that the cycle is gradually building up.

The first sockeye were observed in Stuart lake about August 1, but what is referred to as the second run commenced about September 9. The latter run apparently spawned in the Tachie and Middle rivers and did not enter the streams to which the earlier supply ascended. This variety of salmon goes as far as the Driftwood river, at the head of Takla lake.

Francois Lake System.—The return of sockeye was not as great as was expected in view of the increase in parent sockeye which reached the area in 1933. This season's return is estimated at not more than thirty per cent of that four years previous.

Quesnel Area.—Bowron Lake and Quesnel Lake systems showed some improvement over recent seasons, including the brood year; although the numbers were small, yet the percentage of increase was encouraging.

Adult salmon were observed in Bowron river, Mitchell river, and Horsefly river.

The Chilco Lake run was very satisfactory, and exceeded the splendid run of the brood year by approximately ten per cent. The local officer, who has had a considerable number of years' experience in the examination of these spawning beds, reports having seen this season at least 110,000 spawning sockeye. They arrived in good condition and spawned under favourable conditions. The guardian suggests that this is the largest quantity seen since 1922.

North Thompson River Area.—Raft river and Finn creek contained light runs, showing no increase over those of the fourth year previous.

Kamloops Area.—The principal sockeye spawning beds in this district are to be found in Adams river and Middle river. The runs were very similar to the runs of the brood year, and the fish spawned under good conditions.

Seton-Anderson Lake System.—A remarkably fine return of sockeye to this area was observed, the local inspector estimating the quantity at approximately 60,000 adults, compared with some 10,000 in the preceding year, and practically none in the brood year, 1933. It is interesting to note in connection with this area that for years the department has been endeavouring, by means of eyed eggs and fry, to build up a run of sockeye similar to that occurring previous to 1913. The last two years have brought the first real encouragement observed.

At the commencement of the run this season it was observed that a small percentage of the females were dying unspawned. Samples were immediately forwarded to the Biological Station. No cause for this loss was found.

Harrison-Birkenhead System.—The supply of parent sockeye during the season under review was considerably greater than expected, having regard to the disappointing conditions of 1933 in the Birkenhead system. Satisfactory spawning has taken place.

In the streams tributary to Harrison lake, supplies similar to those of recent years were found on the spawning grounds, and in Morris creek the numbers were greater than for several seasons previous to 1936.

Cultus Lake-Chilliwack Lake System.—The quantity of sockeye returning to Cultus lake was for some reason smaller than anticipated, the total reaching only 3,055 compared with 3,425 in the brood year of 1933, by actual count. There was a normal supply in the Chilliwack Lake system.

Pitt Lake System.—The inspecting officer reports the supply in this district was greater than in the preceding season, and considerably better than was found in the brood year of 1933.

Spring Salmon.—On the whole, the supply of spring salmon found on the spawning grounds was considered to be about normal.

Coho.—The coho supply seems to have been short, as happened in other districts along the coast. However, a special closed period in District No. 1 permitted a larger percentage of the run to pass to the spawning grounds and the seeding, while not heavy, was fair.

Pinks.—This was the year of the big run of pink salmon to the lower mainland district, and whilst the early portion of the run was disappointing, the special closed time enforced in District No. 1 led to a satisfactory seeding of the spawning grounds. The escapement to the Chilliwack river, Harrison River district, Burrard Inlet streams, and those of Howe sound was very good.

Chums.—The early chum run was disappointing, but, again, the special closed time provided for an escapement sufficient to seed the spawning grounds.

Alert Bay Area.—The early run of sockeye to the Nimpkish system, which is the principal spawning ground of this species in the area, was rather light, but improved greatly as the season advanced. Water conditions were such as to permit the salmon to pass safely up stream as they arrived. Weather conditions prevented the usual comprehensive examination of this area but reliable information indicates that the spawning was quite satisfactory. At Port Neville the escapement was quite good, whilst at Keough river, Mackenzie sound, Shushartie and Nahwitti, the escapement was fairly light.

Coho spawning was comparatively light, although early closing permitted an increased percentage of the run to pass up stream.

This being an "off" year for pinks, the escapement was quite light.

In the case of chums, there was a heavy seeding at Viner sound. Other chum streams in the area were only fairly well seeded.

Quathiaski Area.—The only sockeye areas in this subdistrict are Hayden bay and Phillips arm. The seeding of the former was unusually good but there was only a light supply at the latter point.

The spawning of springs was very satisfactory, particularly at Campbell river, where fishing is so intensive by sportsmen.

The coho seeding was not as good as could be wished, but was comparatively satisfactory.

This was an "off" year in this area for pinks but the escapement was quite good, comparatively.

A satisfactory seeding was observed in the case of chums.

Comox Area.—There are no sockeye in this subdivision.

The seeding of springs was better than in an average year, particularly at the Puntledge river, which is the main spring salmon stream in the area.

The coho supply on the spawning grounds was not up to expectations, and 1937 being an "off" year for pinks, there was only a light supply with the exception of Oyster river where the seeding was better than in the last two years. In the Tsolum river, also, an unexpectedly large run reached the spawning grounds.

The supply of chums was an average one.

Pender Harbour Area.—Sockeye appear only commercially at Saginaw creek. The escapement this year was not as good as usual. The run to this point, however, is never large.

There was an average escapement of springs, but the seeding of cohoes was lighter than usual.

Pinks, on the other hand, showed a decided increase over the brood year of 1935. This is particularly the case in the streams tributary to Jervis inlet.

The chum supply was found to be only fair.

Nanaimo Area.—Although this is not a sockeye area, the attempt was made by the department to establish a run at the Nanaimo river by the planting of sockeye eggs taken from Rivers inlet. Over 100 parent sockeye were observed passing up to the spawning grounds and it is assumed that these are the result of the department's efforts.

The work done during the year by the department in providing easier access to the spawning grounds past the falls in the Nanaimo river permitted a larger percentage of parent salmon than usual to pass safely up stream.

The spring supply was found to be greater than for several years past. The same condition obtained in the case of the cohoes and pinks, although the pink run is never large.

Ladysmith Area.—Springs, cohoes, and pinks were found in this area in about normal quantities, and a good run of chums passed up the Chemainus river.

Cowichan Area.—The supply of springs in this area was better than the average.

Coho escapement was about normal, and in the case of chums medium.

The supply of steelheads was found to be fully equal to the best of the runs in recent years.

Victoria Area.—Light supplies of cohoes and chums appeared on the spawning grounds, but the situation is not considered in any way alarming.

Alberni Area.—Again this year there was ample evidence to show that the department's efforts in the way of rehabilitating the sockeye runs to the Great Central, Sproat and Anderson Lakes systems, have been very successful. Continued high water during the run of sockeye resulted in a smaller catch but an excellent escapement. At Anderson lake the supply was estimated at 50 per cent greater than that of the brood year. Conditions found at Hobarton river in the Nitinat area were also good.

The spring supply in the Somass and Nitinat systems was better than in recent years and the seeding at Sarita, Toquart, and Nitinat rivers was eminently satisfactory.

Coho supply was found to be normal, but the pinks did not appear in any quantities, except in the San Juan river. This is not, however, an important pink area. In the case of chums, the seeding was better than usual.

Clayoquot Area.—Sockeye seeding in the Kennedy Lake system was better than in the brood year of 1933. This applies also to Medgin river.

Springs were not so numerous but cohoes were found to be more plentiful than during normal years.

This is not an important pink area, but the pink seeding was of average size.

Conditions in the case of the chums were found to be average.

Nootka Area.—Few sockeye frequent this area but the usual run to the Gold River spawning grounds was observed. Normal conditions applied in the case of springs and cohoes.

Pinks do not appear here in commercial quantities.

The spawning of chums was found to be exceptionally good.

Kyuquot Area.—Only small runs of the creek variety of sockeye appear on the spawning grounds of this area and the spawning was normal.

The seeding in the case of the spring salmon is estimated as being about 100 per cent greater than during the previous season.

The coho supply was also found to compare favourably with that of other years.

In the case of chums, the situation is not so satisfactory, although special precautions by means of early closure were taken to assure of the escapement of a larger percentage of the run.

Quatsino Area.—The small supply of the creek variety of sockeye usually found was present.

The seeding of springs at Marble creek was not up to normal.

The seeding of cohoes was fair, but the pinks were few, due to the fact that this was an "off" year.

Heavier supplies of chums were observed in the streams of the southeast arm, and the seeding throughout the district was satisfactory.

STATEMENT No. 1

ANNUAL CANNED SALMON PRODUCTION IN BRITISH COLUMBIA.

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued						Pack canned								
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	Totals
1925.....	65	4,225	1,821	329	37	19	392,643	39,142	4,419	29,938	10,675	1,996	188,505	445,400	607,904	1,720,622
1926.....	76	4,750	2,416	445	41	6	336,995	41,276	4,177	23,736	19,445	2,165	162,449	772,993	701,962	2,065,198
1927.....	76	5,637	3,093	555	46	7	308,032	34,029	8,819	16,129	20,820	1,462	147,611	48,6177	562,109	1,380,449
1928.....	62	5,179	2,987	399	22	7	203,541	11,002	2,328	5,526	6,073	865	150,684	792,362	863,257	2,035,636
1929.....	63	5,609	2,630	371	24	7	281,306	8,295	3,156	7,926	22,246	672	174,198	477,969	424,982	1,400,750
1930.....	59	6,061	3,115	343	21	7	477,678	20,184	6,650	11,970	42,033	1,656	148,561	1,111,937	401,114	2,221,783
1931.....	35	4,893	3,115	228	21	7	291,464	17,526	4,727	4,894	25,296	1,326	76,879	206,995	55,997	685,104
1932.....	44	5,359	3,033	157	30	7	284,355	46,953	14,133	14,974	28,505	1,168	160,466	223,716	306,761	1,081,031
1933.....	49	6,113	2,880	238	31	8	258,107	12,464	1,849	5,953	21,763	1,459	137,289	532,558	293,630	1,265,072
1934.....	49	6,826	3,099	296	9	8	377,882	15,281	1,644	12,859	29,556	1,282	195,874	435,364	513,184	1,582,926
1935.....	43	6,216	3,107	293	9	8	350,444	10,187	3,114	8,619	15,319	1,596	216,173	514,966	409,604	1,529,053
1936.....	46	6,620	3,511	287	9	7	415,024	16,493	2,527	10,834	33,718	1,068	212,343	591,532	597,487	1,881,026
1937.....	32	6,095	3,162	291	9	5	325,774	10,963	1,788	3,420	19,236	844	113,972	585,576	447,602	1,509,175

NOTE.—Licences issued include transfers from one district to another, except in the case of purse seines after 1929.

PACK OF CANNED SALMON ON THE NAAS RIVER—1925 TO 1937

STATEMENT No. 2

Year	Num-ber of can-eries oper-ated	Number of salmon licences issued				Pack canned										Totals	
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum		
							cases	cases	cases	cases	cases	cases	cases	cases	cases	cases	cases
*1925.....	3	210	.....	.....	.....	.....	20,351	5,441	387	538	.....	470	8,188	35,880	23,497	94,752	
†1925.....	.....	.....	.....	.....	.....	.....	18,945	4,067	387	392	.....	457	7,726	34,580	22,504	89,008	
*1926.....	4	316	.....	.....	.....	.....	15,929	4,616	751	597	.....	375	4,274	43,891	15,392	85,825	
†1926.....	.....	.....	.....	.....	.....	.....	15,929	4,616	751	597	.....	375	4,274	50,815	15,392	92,749	
*1927.....	4	302	.....	.....	.....	.....	11,986	3,221	511	213	.....	96	3,845	16,609	3,307	39,788	
†1927.....	.....	.....	.....	.....	.....	.....	11,986	3,221	511	213	.....	96	3,845	16,609	3,307	39,788	
*1928.....	3	263	.....	.....	.....	.....	5,558	1,471	68	615	.....	36	18,002	95,998	4,501	126,339	
†1928.....	.....	.....	.....	.....	.....	.....	5,540	1,471	68	307	.....	36	10,734	83,183	3,538	104,877	
*1929.....	3	240	.....	.....	.....	.....	16,347	256	57	96	.....	.....	1,195	10,507	1,261	29,719	
†1929.....	.....	.....	.....	.....	.....	.....	16,077	256	57	96	.....	.....	1,145	10,342	1,212	29,185	
*1930.....	3	282	.....	.....	.....	.....	26,500	1,772	283	176	.....	137	5,555	90,163	4,330	128,916	
†1930.....	.....	.....	.....	.....	.....	.....	26,405	1,722	283	176	.....	84	9,961	79,976	3,853	113,460	
*1931.....	1	235	.....	.....	.....	.....	16,929	1,010	323	106	.....	.....	8,943	5,178	660	33,149	
†1931.....	.....	.....	.....	.....	.....	.....	9,146	1,010	323	106	.....	.....	1,443	3,575	392	14,995	
*1932.....	3	278	.....	.....	.....	.....	15,138	5,848	264	468	.....	23	33,495	51,920	15,070	122,226	
†1932.....	.....	.....	.....	.....	.....	.....	14,154	3,676	264	468	.....	10	7,955	44,629	14,515	85,671	
*1933.....	3	297	.....	.....	.....	.....	10,173	1,014	227	214	.....	114	19,016	57,406	2,778	90,942	
†1933.....	.....	.....	.....	.....	.....	.....	9,757	885	127	184	.....	49	3,251	44,306	1,775	60,434	
*1934.....	3	335	.....	.....	.....	.....	36,242	533	226	145	.....	311	26,698	37,698	5,538	107,311	
†1934.....	.....	.....	.....	.....	.....	.....	28,701	383	126	145	.....	311	9,935	32,965	2,648	75,214	
*1935.....	3	310	.....	.....	.....	.....	12,712	94	298	168	.....	143	21,810	25,508	17,481	78,214	
†1935.....	.....	.....	.....	.....	.....	.....	12,245	86	298	168	.....	143	5,125	21,443	12,681	52,189	
*1936.....	3	349	.....	.....	.....	.....	28,562	1,622	229	316	.....	496	11,842	72,022	20,196	135,285	
†1936.....	.....	.....	.....	.....	.....	.....	24,137	520	188	237	.....	496	8,439	60,582	16,504	111,103	
*1937.....	2	321	.....	.....	.....	.....	17,590	773	245	232	.....	46	12,336	7,876	10,530	49,628	
†1937.....	.....	.....	.....	.....	.....	.....	11,630	773	245	232	.....	46	316	5,688	6,009	24,939	

* Pack of fish caught at Naas river regardless where canned. † Pack of Naas river regardless where caught.
 Note.—Licences issued, except 1925, include transfers from other districts.

REPORT OF THE DEPUTY MINISTER

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Pack canned										Totals	
		G. N.	Troll	P. S.	D. S.	T. N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum			
						cases	cases	cases	cases	cases	cases	cases	cases	cases	cases	cases		
†1925	13	1,067					77,785	17,811	1,657	2,457		700	38,029	197,226	10,687	276,352		
†1925							81,149	19,185	1,657	2,603		713	39,168	130,083	74,308	348,866		
†1926	15	1,129					82,307	17,896	966	1,750		764	30,153	170,586	46,382	350,804		
†1926							82,357	17,896	966	1,750		764	30,209	210,064	63,527	407,533		
†1927	13	1,195					83,988	13,595	3,567	1,609		646	25,209	38,903	9,656	177,173		
†1927							83,984	14,856	3,567	1,609		580	25,623	38,761	18,659	187,639		
†1928	11	1,208					34,524	4,121	988	397		231	18,751	191,812	11,792	262,616		
†1928							34,559	5,043	988	354		241	30,194	209,579	17,751	298,709		
†1929	11	1,143					77,714	3,795	441	383		13	37,138	94,846	3,625	217,955		
†1929							78,014	3,795	441	383		13	37,456	95,305	4,835	220,245		
†1930	11	1,202					130,952	6,589	1,047	322		60	24,191	214,266	3,327	380,754		
†1930							132,372	6,674	1,047	324		58	29,203	275,642	5,057	450,377		
†1931	8	1,076					107,936	7,040	2,284	534		768	20,146	41,264	3,893	183,865		
†1931							93,029	7,040	2,284	534		768	10,737	44,807	3,610	162,809		
†1932	10	1,119					59,916	16,378	9,419	2,472		404	48,312	58,261	38,549	233,711		
†1932							52,624	14,268	9,419	2,472		365	20,549	32,519	28,756	160,972		
†1933	10	1,218					30,506	2,026	444	227		267	39,896	95,783	15,714	185,463		
†1933							27,693	6,805	444	828		201	21,366	79,932	10,970	148,239		
†1934	9	1,164					70,654	6,844	592	860		114	54,470	125,163	24,388	283,085		
†1934							54,558	6,809	592	860		131	21,298	27,628	6,242	118,118		
†1935	9	1,053					64,140	3,443	429	188		12	45,512	99,412	31,807	244,943		
†1935							52,879	3,422	429	188		14	23,498	81,868	8,122	170,420		
†1936	8	970					97,823	4,883	455	435		33	55,198	178,299	36,892	374,018		
†1936							81,960	3,781	414	356		33	32,142	92,997	15,343	227,026		
†1937	7	850					55,811	3,788	382	315		21	34,502	72,455	37,431	204,705		
†1937							41,023	3,704	382	315		21	14,573	57,623	10,027	127,668		

† Pack of fish caught at Skeena river regardless where canned.

‡ Pack at Skeena river regardless where caught.

NOTE.—Licences issued include transfers from other districts.

PACK OF CANNED SALMON FROM FISH CAUGHT AT RIVERS INLET AND SMITHS INLET—1925 TO 1937

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Pack canned										Totals
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum		
1925	11	1,127					201,186	344	311	116		10	4,887	7,675	11,501	226,030	
1925							170,381	215	317	57			4,866	8,695	11,477	196,132	
1926	12	1,483					89,866	535	249	160		27	10,348	8,493	14,600	124,368	
1926							74,629	473	189	142		11	7,448	13,503	11,761	108,146	
1927	13	1,842					101,053	463	530	321		19	5,475	1,383	5,027	114,271	
1927							87,145	322	530	321		17	4,980	1,402	3,617	98,324	
1928	11	1,541					93,361	458	443	157		13	9,761	3,130	9,200	116,523	
1928							88,876	166	443	152		13	1,098	16,703	3,626	111,066	
1929	13	1,577					79,548	546	215	127		47	8,270	3,112	6,536	98,401	
1929							77,669	140	239	107		41	3,239	1,340	1,091	83,866	
1930	12	1,833					150,398	614	383	229		182	6,760	17,476	18,414	194,414	
1930							141,684	275	383	215		208	2,084	34,638	2,135	181,622	
1931	5	1,433					92,872	218	61	183		69	5,536	2,296	544	101,779	
1931							80,732	200	82	165		68	6,683	3,724	592	92,216	
1932	10	1,754					86,110	405	236	145		56	11,871	4,305	5,516	108,644	
1932							85,358	128	236	143		49	7,355	4,631	1,109	98,989	
1933	11	1,962					119,548	606	108	243		153	9,078	11,658	8,932	150,226	
1933							114,045	454	108	241		169	8,514	25,054	9,518	158,103	
1934	11	2,318					89,375	532	82	129		121	11,862	2,928	14,375	119,604	
1934							82,828	590	82	128		122	8,793	9,769	16,444	118,556	
1935	8	2,023					166,686	138	352	155		63	9,576	8,966	19,563	205,499	
1935							129,631	94	306	146		49	917	6,045	7,128	144,216	
1936	8	2,210					59,138	317	132	162		60	7,432	6,497	13,158	86,896	
1936							42,803	315	151	148		54	7,683	17,254	10,921	79,309	
1937	6	1,875					108,170	377	396	235		75	6,374	7,973	18,894	142,494	
1937							91,399	335	452	233		76	5,331	18,873	21,931	138,631	

NOTE.—Figures shown in roman are packs from fish caught at Rivers inlet or Smiths inlet. Figures shown in italics are actual packs irrespective of where fish taken and not including fish shipped out for canning in other districts. Licences issued include transfers from other districts.

PACK OF CANNED SALMON IN THE FRASER RIVER DISTRICT—1925 TO 1937

STATEMENT No. 5

Year	Num- ber of can- neries oper- ated	Number of salmon licences issued					Pack canned									
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue- back	Steel- head	Coho	Pink	Chum	Totals
1925.....	10	969	50				cases 31,523	cases 7,335	cases 873	cases 25,482	cases 5,107	cases 45	cases 36,717	cases 99,800	cases 66,111	cases 272,993
1926.....	10	1,063	59				83,589	11,774	1,030	20,130	14,036	39	21,787	32,256	88,493	273,134
1927.....	10	1,249	111				57,085	6,553	1,351	10,493	10,621	37	24,079	102,535	67,259	280,013
1928.....	8	1,303	109				26,530	1,173	248	3,661	795		27,061	2,881	193,106	255,455
1929.....	9	1,473	113				60,407	2,984	912	5,977	11,960	53	40,540	158,290	144,208	425,331
1930.....	8	1,523	115				107,896	8,300	3,066	9,761	27,857	22	25,535	30,754	68,946	282,137
1931.....	7	1,358	154				54,688	5,970	1,185	3,187	14,697	4	13,468	21,534	948	115,681
1932.....	8	1,446	166				83,447	19,994	3,622	11,020	16,558	23	28,685	9,813	45,100	218,262
1933.....	10	1,685	110	64			53,481	5,701	426	4,554	13,299		25,715	143,058	77,330	323,564
1934*.....	11	1,803	98	105			145,579	5,495	263	11,072	22,566		30,751	35,847	219,331	470,904
1934†.....							133,159	4,713	173	10,760	1,607		10,991	342	103,081	264,826
1935*.....	10	1,663	124	108			76,415	5,181	326	6,783	7,701		63,933	182,528	72,353	415,220
1935†.....							57,212	4,205	212	4,984	350		24,600	111,328	8,227	211,118
1936*.....	11	1,784	118				165,651	7,128	461	8,426	20,647	6	51,243	23,842	188,538	465,942
1936†.....							164,408	6,680	310	8,142			22,572	2	30,663	232,777
1937*.....	10	2,082	190	58			103,137	3,877	226	1,940	19,065	15	25,618	252,416	119,254	525,548
1937†.....							66,583	3,622	84	1,738	1,354	15	11,242	87,897	20,934	193,469

* Represents actual pack, regardless where caught.

† Represents pack of Fraser fish, regardless where canned.

NOTE.—Licences issued include transfers from other districts.

NOTE.—1936† pack of Sockeye on Fraser, 164,408 cases, does not include 16,611 cases Sockeye caught on Fraser and exported and canned in Puget Sound canneries.

DEPARTMENT OF FISHERIES

STATEMENT No. 6

PACK OF CANNED SALMON OF PUGET SOUND, U.S.A., FROM 1925 TO 1937

Year	Number of canneries operated	Spring	Sockeye	Coho	Chum	Pink	Steel- head	Total
		cases	cases	cases	cases	cases	cases	cases
1925.....	23	28,268	106,064	171,587	41,635	555,848	141	903,543
1926.....	14	27,763	44,569	120,846	112,411	2,125	63	307,777
1927.....	21	43,443	96,343	133,528	37,414	585,506	216	896,450
1928.....	12	24,628	61,044	92,770	145,735	5,816	265	330,258
1929.....	21	32,600	111,855	101,363	150,867	727,748	280	1,124,713
1930.....	13	29,378	352,194	122,691	64,234	3,712	397	572,606
1931.....	18	28,066	83,728	76,025	55,189	705,580	293	948,881
1932.....	10	23,964	78,319	60,740	146,151	1,677	60	310,911
1933.....	19	20,869	125,738	44,568	37,039	543,340	222	771,776
1934.....	20	14,398	352,579	69,254	73,337	3,606	.....	513,174
1935.....	14	9,737	54,677	71,985	15,604	377,445	.....	529,448
1936.....	9	6,328	59,505	29,191½	80,831½	1,345	.....	177,201
1937.....	14	8,968	60,259	32,559	17,417	327,833	.....	447,036

STATEMENT No. 7

STATEMENT OF HALIBUT LANDINGS—BRITISH COLUMBIA—1913 TO 1937
(Includes landings in United States bottoms)

	Cwt.		Cwt.
1913.....	223,465	1925.....	318,240
1914.....	214,444	1926.....	315,095
1915.....	194,896	1927.....	271,354
1916.....	123,062	1928.....	302,820
1917.....	113,529	1929.....	304,364
1918.....	186,229	1930.....	254,796
1919.....	210,777	1931.....	182,005
1920.....	238,770	1932.....	168,847
1921.....	325,868	1933.....	170,372
1922.....	293,184	1934.....	182,602
1923.....	334,667	1935.....	171,143
1924.....	331,382	1936.....	168,121
		1937.....	187,425

STATEMENT No. 8

STATEMENT OF DRY SALT HERRING PACKS, 1918-1937—BRITISH COLUMBIA

Year	District No. 1	District No. 2	District No. 3		Total
			East coast	West Coast	
	cwt.	cwt.	cwt.	cwt.	cwt.
1918.....	20,000	.....	109,900	42,710	172,610
1919.....	4,000	.....	43,000	208,058	255,058
1920.....	807	1	176,640	334,720	512,168
1921.....	249	.....	231,240	248,482	479,971
1922.....	.....	.....	297,871	224,897	522,768
1923.....	.....	8,935	250,420	484,681	744,036
1924.....	.....	.....	305,266	548,277	853,543
1925.....	.....	4,120	591,162	487,892	1,083,174
1926.....	11,134	4,192	596,114	327,207	938,647
1927.....	24,380	7,600	542,385	473,825	1,048,190
1928.....	46,995	.....	748,032	277,161	1,072,188
1929.....	78,800	5,160	691,673	140,751	916,384
1930.....	19,114	.....	546,342	240,517	805,973
1931.....	.....	.....	668,506	119,721	788,227
1932.....	.....	.....	219,398	50,022	269,420
1933.....	.....	.....	448,944	64,080	513,024
1934.....	.....	.....	310,026	104,600	414,626
1935.....	.....	.....	280,290	22,420	302,710
1936.....	.....	.....	357,337	26,000	383,337
1937.....	.....	.....	203,401	.....	203,401

STATEMENT No. 9

CANNED PILCHARD PACK—BRITISH COLUMBIA—1917 TO 1937

	Cases		Cases
1917.....	1,090	1927.....	58,501
1918.....	63,693	1928.....	65,097
1919.....	63,065	1929.....	98,821
1920.....	91,929	1930.....	55,166
1921.....	16,091	1931.....	17,336
1922.....	19,186	1932.....	4,622
1923.....	17,195	1933.....	2,946
1924.....	14,898	1934.....	35,437
1925.....	37,182	1935.....	27,184
1926.....	26,731	1936.....	35,007
		1937.....	40,975

STATEMENT No. 10

PRODUCTION FISH OIL AND MEAL—BRITISH COLUMBIA, 1920-1937

Year	From Pilchards		From Herring		From Whales			From Other Sources	
	Meal and fertilizer	Oil	Meal	Oil	Whale-bone and meal	Fertilizer	Oil	Meal and fertilizer	Oil
	tons	gals.	tons	gals.	tons	tons	gals.	tons	gals.
1920.....					503	1,035	604,070	466	55,669
1921.....								489	44,700
1922.....					326	230	283,314	911	75,461
1923.....					485	910	706,514	823	180,318
1924.....					292	926	645,657	1,709	241,376
1925.....	2,083	495,653			347	835	556,939	2,468	354,853
1926.....	8,481	1,898,721	310	13,700	340	666	468,206	1,752	217,150
1927.....	12,169	2,673,876	1,838	170,450	345	651	437,967	2,512	375,130
1928.....	14,500	3,995,806	831	68,411	376	754	571,914	3,658	411,207
1929.....	15,826	2,856,579	932	34,924	416	779	712,597	3,671	461,915
1930.....	13,934	3,204,058	915	60,373	273	581	525,533	2,420	182,636
1931.....	14,200	2,551,914	3,904	110,810				1,747	241,682
1932.....	8,842	1,315,864	6,195	186,173				413	45,517
1933.....	1,108	275,879	4,078	316,213	249	223	509,310	1,596	187,560
1934.....	7,626	1,635,123	2,570	104,710	340	631	813,724	2,458	337,028
1935.....	8,681	1,649,392	5,262	306,767	211	354	426,772	2,147	247,437
1936.....	8,715	1,217,097	10,085	782,499	332	687	763,740	3,148	335,969
1937.....	8,483	1,707,276	14,427	1,283,658	268	527	662,355	2,720	294,546

STATEMENT No. 11

NUMBER OF WHALES LANDED—BRITISH COLUMBIA, 1922-1937*

Species	1922	1923	1924	1925	1926	1927	1928	1929	1930	1933	1934	1935	1936	1937
Sperm.....	38	94	83	76	80	82	83	146	147	190	265	175	311	265
Sulphur.....	4	62	56	29	14	10	47	16	10	1		6	3	1
Fin.....	94	166	125	135	124	138	140	168	62	17		71	20	44
Hump.....	50	78	47	40	25	21	21	9	12		14	1	14	7
Sel.....	1	53	100	68	25	7	13	67	89	1			2	
Right.....			2		1									
Bottlenose.....		2	1	3			1	1						
Totals.....	187	455	414	351	269	258	305	407	320	209	350	202	378	317

* No whaling plants operated 1931 and 1932.

STATEMENT No. 12

STATEMENT OF FUR SEAL SKINS TAKEN AND LANDED, BRITISH COLUMBIA, 1912-1937

Year	District No. 2	District No. 3	Total
	No.	No.	No.
1912.....		205	205
1913.....	285	119	404
1914.....	95	257	352
1915.....	39	400	439
1916.....	21	138	159
1917.....	14	204	218
1918.....	78	10	88
1919.....	53	17	70
1920.....	502	556	1,058
1921.....	270	2,079	2,349
1922.....	291	639	930
1923.....	678	3,746	4,424
1924.....	370	1,862	2,232
1925.....	810	3,655	4,465
1926.....	655	2,169	2,824
1927.....	188	1,288	1,476
1928.....	465	1,625	2,090
1929.....	1,119	2,264	3,383
1930.....	195	2,102	2,297
1931.....	76	1,387	1,463
1932.....	88	1,699	1,787
1933.....	237	1,747	1,984
1934.....	98	158	256
1935.....	63	778	841
1936.....		1,888	1,888
1937.....		2,671	2,671

STATEMENT No. 13

STATEMENT OF LICENCES ISSUED FOR SALMON CANNERIES AND SALMON FISHING GEAR (NOT INCLUDING LICENCES TO CAPTAINS AND ASSISTANTS ON SALMON SEINE BOATS OR ASSISTANTS ON SALMON GILL-NET BOATS.) BRITISH COLUMBIA—1927-1937

Kind of Licence	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
<i>District No. 1—</i>											
Salmon cannery.....	10	10	9	11		8	10	11	10	11	10
Salmon trap-net.....	111	109	113	115	154	166	110	98	124	118	190
Salmon purse-seine.....											
Salmon drag-seine.....	1,249	1,303	1,473	1,523	1,358	1,446	1,685	1,803	1,663	1,784	2,082
Salmon gill-net.....											
<i>District No. 2—</i>											
Salmon cannery.....	48	47	45	26	21	28	29	31	26	27	20
Salmon trap-net.....											
Salmon purse-seine.....	244	158	153	152	71	53	55	109	102	99	82
Salmon drag-seine.....	16	9	9	9	9	9	11	9	9	9	9
Salmon gill-net.....	938	864	738	891	884	875	882	937	930	964	916
Salmon gill-net:—											
Lowes inlet.....						29	59	67	58	74	76
Naas river.....	302	263	246	282	235	278	297	335	310	349	321
Skeena river.....	1,198	1,208	1,143	1,202	1,076	1,119	1,218	1,164	1,053	970	856
Rivers Inlet.....	1,273	1,117	1,149	1,449	1,144	1,461	1,603	1,899	1,699	1,802	1,490
Smiths Inlet.....	570	424	428	384	289	293	359	419	324	408	385
Bella Coola.....	195	173	236	359	240	238	228	285	268	265	261
Kimsquit.....	104	80	194								
Butedale.....	108	58	56	71	51	55	43	48	41	57	18
Namu.....	180	77	116	142	108	100	107	141	129	146	137
Queen Charlotte islands.....	42	22	3	6	5	4	2	19		24	4
Total, salmon gill-net, District No. 2.....	3,972	3,422	3,571	3,895	3,148	3,577	3,916	4,377	3,882	4,095	3,548
<i>District No. 3—</i>											
Salmon cannery.....	18	19	17	17	7	8	10	7	7	8	7
Salmon trap-net.....	7	7	7	7	7	7	8	8	8	7	5
Salmon purse-seine.....	308	239	218	191	157	104	183	187	191	188	209
Salmon drag-seine.....	30	13	13	12	12	21	20				
Salmon trolling.....	2,045	2,014	1,779	2,109	2,077	1,992	1,888	2,064	2,053	2,429	2,056
Salmon gill-net.....	422	454	565	643	387	336	512	646	673	741	466
<i>Whole Province—</i>											
Salmon cannery.....	76	76	71	54	35	44	49	49	43	46	37
Salmon trap-net.....	7	7	7	7	7	7	8	8	8	7	5
Salmon purse-seine.....	552	397	371	243	228	157	236	296	293	287	291
Salmon drag-seine.....	46	22	22	21	21	30	31	9	9	9	9
Salmon trolling.....	3,094	2,987	2,630	3,115	3,115	3,033	2,880	3,099	3,107	3,511	3,162
Salmon gill-net.....	5,643	5,179	5,609	6,061	4,893	5,359	6,113	6,826	6,218	6,620	6,096

NOTE.—During the season 1928 F. Millerd's cannery at Vancouver, the Cassiar cannery on the Skeena and the Massett Cannery, Massett Inlet, operated without licences, and are not included in the number of cannery licences shown above. with year 1930 salmon cannery licences shown above were issued by the Provincial Fisheries Department.

STATEMENT No. 14

STATEMENT OF POWER BOATS OPERATED IN DISTRICT No. 2, BRITISH COLUMBIA,
IN CONNECTION WITH SALMON GILLNET OPERATIONS

—	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
Naas river.....	3	9	35	21	37	34	119	142	179	233	268	243	327	278
Skeena river.....	18	64	133	162	216	263	472	603	660	668	732	804	842	824
Bella Coola and Kimsquit.....	1	12	49	47	90	103	70	124	94	89	101	156	150	139
Central area.....		8	28	87	13	73		68	111	165	234	161	252	244
Rivers inlet.....	54	110	254	248	479	435	712	682	776	901	1,233	1,164	1,287	1,122
Smiths inlet.....	9	39	131	110	204	135	231	176	175	219	299	285	302	328
Queen Charlotte Islands.....					10								24	
	85	242	630	675	1,049	1,010	1,658	1,765	1,990	2,287	2,922	2,807	3,173	2,957

STATEMENT No. 15

PACK OF SOCKEYE SALMON FROM RUNS TO FRASER RIVER, 1925-1937

Year	Fraser river canneries	Canadian traps in Juan de Fuca Straits	Puget Sound (U.S.A.) canneries	Total Cases
1925.....	31,523	3,862	106,064	141,449
1926.....	83,589	2,091	44,569	130,249
1927.....	57,085	4,337	96,343	157,765
1928.....	26,530	2,769	61,044	90,343
1929.....	60,407	3,480	111,856	175,743
1930.....	93,416*	5,334	352,194	450,944
1931.....	38,507*	2,440	83,728	124,675
1932.....	61,769*	4,000	78,319	144,088
1933.....	43,745*	8,721	125,738	178,204
1934.....	133,159*	6,117	352,579	491,855
1935.....	57,212*	5,610	54,677	117,499
1936.....	164,408*	3,837	59,505	227,750
1937.....	66,583*	6,152	60,259	132,994

* Does not include sockeye canned on Fraser and caught in other districts.

NOTE.—1934 pack at Fraser river canneries includes 5,643 cases sockeye caught on Fraser river and canned in other districts. A statement showing the yearly figures from 1876 to 1930 will be found in the departmental report for 1930-31.

NOTE.—1936 Pack at Fraser River canneries includes 18,320 cases Sockeye caught on Fraser and canned in other districts.

STATEMENT No. 16
STATEMENT OF FISHERY LICENCES ISSUED, WHOLE PROVINCE, SEASON 1937

Variety of Licence	Issued					Transfers			Operating							
	White	Ind.	Others	Jap R.S.	Can- celled	Total	White	Ind.	Jap R.S.	Total	White	Ind.	Others	Jap R.S.	Can- celled	Total
Salmon trap-net.....	5	9	.....	.....	.....	5	.....	.....	.....	.....	5	9	.....	.....	.....	5
Salmon drag-seine.....	.....	73	.....	.....	2	291	.....	.....	.....	.....	.....	73	.....	.....	.....	291
Salmon purse-seine.....	216	1,220	911	44	89	5,189	703	189	15	907	216	1,409	911	59	89	6,096
Salmon gill-net.....	2,925	1,280	155	6	13	3,136	26	.....	.....	26	3,628	485	155	6	13	3,162
Salmon trolling.....	2,477	272	528	.....	1	952	.....	.....	.....	.....	2,503	272	528	.....	1	3,952
Asst. salmon gill-net.....	151	272	.....	.....	2	166	.....	.....	.....	.....	151	272	.....	.....	2	166
Capt. salmon seine.....	65	99	.....	.....	1	166	.....	.....	.....	.....	65	99	.....	.....	1	166
Asst. salmon seine.....	909	756	.....	.....	1	1,666	.....	.....	.....	.....	909	756	.....	.....	1	1,666
Cod.....	299	27	152	3	18	499	.....	.....	.....	.....	299	27	152	3	18	499
Crab.....	123	21	1	3	.....	148	.....	.....	.....	.....	123	21	.....	.....	.....	148
Crayfish.....	56	11	94	.....	.....	161	.....	.....	.....	.....	56	11	94	.....	.....	161
Miscellaneous fishery.....	58	4	33	7	3	105	.....	.....	.....	.....	58	4	33	7	3	105
Small dragger.....	22	.....	10	.....	.....	32	1	.....	.....	1	23	.....	10	.....	.....	33
Smelt.....	27	18	.....	1	1	47	.....	.....	.....	.....	27	18	.....	1	.....	47
Abalone.....	1	.....	2	.....	.....	3	.....	.....	.....	.....	1	.....	2	.....	.....	3
Herring pound permits.....	6	.....	.....	.....	.....	6	.....	.....	.....	.....	6	.....	.....	.....	.....	6
Herring purse-seine.....	44	.....	2	.....	1	47	.....	.....	.....	.....	44	.....	2	.....	1	47
Herring gill-net.....	20	4	4	.....	.....	24	.....	.....	.....	.....	20	4	4	.....	.....	24
Capt. herring seine.....	26	4	4	34	.....	34	.....	.....	.....	.....	26	4	4	.....	.....	34
Asst. herring seine.....	240	80	73	.....	.....	393	.....	.....	.....	.....	240	80	73	.....	.....	393
Pilchard purse-seine.....	32	.....	.....	.....	.....	32	.....	.....	.....	.....	32	.....	.....	.....	.....	32
Capt. pilchard seine.....	27	3	.....	.....	.....	30	.....	.....	.....	.....	27	3	.....	.....	.....	30
Asst. pilchard seine.....	184	13	.....	.....	.....	197	.....	.....	.....	.....	184	13	.....	.....	.....	197
Capt. halibut boat for bait.....	9	.....	.....	.....	.....	9	.....	.....	.....	.....	9	.....	.....	.....	.....	9
Totals.....	7,922	3,077	1,987	64	131	13,181	730	189	15	934	8,652	3,266	1,987	79	131	14,115

LICENCES ISSUED BY PROVINCIAL FISHERIES DEPARTMENT

Whaling permits.....	6	.....	.....	.....	.....	6
Indian Permits.....	2,287	.....	.....	.....	.....	2,287
Anglers' Day Permits.....	845 (5 cancelled)	.....	.....	.....	.....	845
Anglers' Permits (Season).....	936 (1 cancelled)	.....	.....	.....	.....	936
Salmon Cannery.....	38	.....	.....	.....	.....	38
..... (1 not operated)	.....	.....	.....	.....	.....	.....
Salmon Dry Saltery.....	26	.....	.....	.....	.....	26
Fish Cold Storage.....	8	.....	.....	.....	.....	8
Pilchard Cannery.....	3	.....	.....	.....	.....	3
Herring Cannery.....	4	.....	.....	.....	.....	4
Miscellaneous Plants.....	14	.....	.....	.....	.....	14
Commercial Fishery for non-tidal waters.....	147	.....	.....	.....	.....	147
Tierced Salmon plants.....	6	.....	.....	.....	.....	6
Pilchard Reduction.....	9	.....	.....	.....	.....	9
Whale Reduction.....	2	.....	.....	.....	.....	2
Herring Reduction.....	16	.....	.....	.....	.....	16
Herring Dry Saltery.....	5	.....	.....	.....	.....	5

STATEMENT No. 17

STATEMENT OF NUMBERS OF DIFFERENT SPECIES OF SALMON AND METHOD OF CAPTURE, REPORTED BY OPERATORS OF SALMON-PURSE SEINES, DRAG-SEINES, AND TRAP-NETS, AND BY SALMON CANNING, CURING, AND COLD STORAGE ESTABLISHMENTS, OF GILL-NET AND TROLL CAUGHT FISH, BRITISH COLUMBIA—1937.

	Sockeye	Spring	Blue-back	Steel-head	Cohoe	Pink	Chum	Total
Troll.....	1,846	483,871	325,821	81	759,112	8,049	1,727	1,580,507
Gill-net.....	3,710,360	225,270	30,865	87,653	460,725	3,701,250	1,304,959	9,521,082
Purse-seine.....	743,418	85,260	2,190	2,438	231,477	6,425,126	3,565,052	11,054,961
Drag-seine.....	38,156				7,913	24,955	9,014	80,038
Trap-net.....	99,503	19,364		447	22,469	164,268	1,311	307,362
	4,593,283	813,765	358,876	90,619	1,481,696	10,323,648	4,882,063	22,543,950

STATEMENT No. 18

STATEMENT OF NUMBER OF SALMON CAUGHT BY PURSE-SEINES, SHOWN BY SEINING AREAS, SEASON 1937

Area	Sockeye	Spring	Blue-back	Steel-head	Cohoe	Pink	Chum	Total
1.....								
2.....	21				3,120	174	511,776	515,091
3.....	6,400	67		22	767	84,528	88,718	180,502
4.....						600	800	1,400
5.....	24,926	2		6	21,813	90,949	70,100	207,796
6.....	25,751	95			14,252	240,351	216,201	496,050
7.....	36,372	337		144	7,383	302,864	178,290	525,390
8.....	1,674	77		69	3,833	330,538	45,555	381,746
9.....	1,206	43		15	2,548	49,707	100,039	153,558
10.....	12				110	2,218	31,234	33,574
11.....	6,227	28	58	5	164	315	213	7,010
12.....	452,500	5,978	1,309	1,398	74,457	3,693,108	525,450	4,754,200
13.....	104,028	2,505	823	246	34,744	1,050,802	508,234	1,701,382
14.....	2	8		16	1,903		117,518	119,447
15.....					136		11,466	11,602
16.....		1			440	155,031	77,643	233,115
17.....								
18.....	8,903	74,873		490	19,990	381,879	6,397	492,532
19.....								
20.....					11	10	46	67
21.....	2,542	192			8,944	13,900	65,233	90,811
22.....		1			1,145		271,795	272,941
23.....	12,776	1,053		27	10,167		462,874	486,897
24.....	52,637				7,372		74,385	134,394
25.....	1,950				6,763		113,820	122,533
26.....	1,412				1,326		5,211	7,949
27.....	4,079				10,089	28,152	82,054	124,374
Totals....	743,418	85,260	2,190	2,438	231,477	6,425,126	3,565,052	11,054,961

STATEMENT No. 19

STATEMENT SHOWING PACKS OF CANNED SALMON, 1932-1937, WITH QUANTITIES
GRADED SECOND QUALITY AND PERCENTAGES

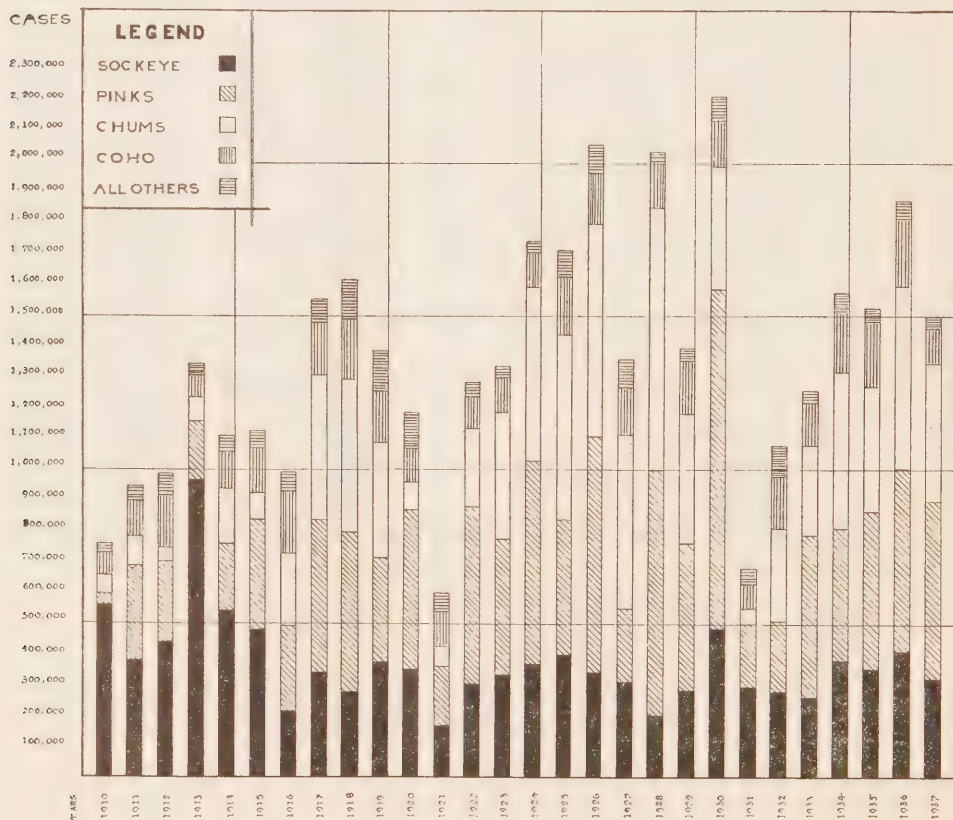
	Sockeye	Springs	Steel- head	Blue- back	Coho	Pinks	Chum	Total
1932 Pack, cases.....	284,355	76,060	1,168	28,505	160,466	223,716	306,761	1,081,031
Grade B, cases.....	3,355	1,234		164	333	119	3,083	8,288
Per cent.....	1.179	1.622		.575	.207	.053	1.005	.766
1933 Pack, cases.....	258,107	20,266	1,459	21,763	137,289	532,558	293,630	1,265,072
Grade B, cases.....	494			10	873	15,149	887	17,413
Per cent.....	.191			.045	.635	2.844	.302	1.376
1934 Pack, cases.....	377,882	29,784	1,282	29,556	195,874	435,364	513,184	1,582,926
Grade B, cases.....	21,620	139	5		962	4,035	1,127	27,938
Per cent.....	5.721	.466	.390		.491	.938	.219	1.764
1935 Pack, cases.....	350,444	21,920	596	15,319	216,173	514,966	409,604	1,529,022
Grade B, cases.....	3,435	659			3,840	20,528	5,601	34,063
Per cent.....	.980	3.006			1.776	3.986	1.367	2.227
1936 Pack, cases.....	415,024	29,854	1,068	33,718	212,343	591,532	597,487	1,881,026
Grade B, cases.....	13,725				483	29	5,265	19,502
Per cent.....	3.307				.227	.005	.881	1.036
1937 Pack, cases.....	325,774	16,171	844	19,236	113,972	585,576	447,602	1,509,175
Grade B, cases.....	65				65	23,858	977	24,965
Per cent.....	.019				.057	4.074	.218	1.654

STATEMENT SHOWING THE TOTAL NUMBER OF POWER BOATS USED IN CONNEC-
TION WITH GILLNET OPERATIONS IN DISTRICT No. 2 SEASON—1937

Whites	Indians	Japanese	Japanese R.S.	Total
1420	1043	467	27	2957

BRITISH COLUMBIA

GRAPH SHOWING TOTAL PACK OF CANNED SALMON BY SPECIES 1910 TO 1937 INCLUSIVE



APPENDIX NO. 2

FISH CULTURE

ANNUAL REPORT BY J. A. RODD, DIRECTOR

Fish cultural operations of the Department of Fisheries are confined to those provinces in which it administers the fisheries in whole or in part, that is, Nova Scotia, New Brunswick, Prince Edward Island and British Columbia. The hatcheries located in the National Parks, Alberta, formerly directed by the Department of Fisheries but at the expense of the National Parks bureau, Lands, Parks and Forests branch, Department of Mines and Resources, were taken over completely on March 31, 1937 by the National Parks bureau, consequently distributions therefrom in 1937 do not appear in this report.

The discontinuance of the British Columbia sockeye salmon hatcheries and the taking over of the hatcheries in the National Parks by the National Parks Bureau is reflected in the distribution statements embodied in this report, showing a considerable decrease as compared with the distributions for 1936.

The total output from the hatcheries operated by this department in 1937 was 61,831,780. The numbers of each species distributed were:—

STATEMENT BY SPECIES OF THE FISH AND FISH EGGS DISTRIBUTED FROM THE HATCHERIES DURING THE YEAR ENDED DECEMBER 31, 1937

Species	Green eggs	Eyed eggs	Fry	Advanced fry	Fingerlings	Yearlings and Older	Total distribution
Salmo salar-Atlantic salmon.....		3,000	235,000	6,071,199	15,192,116	122,997	21,624,312
Salmo salar ouananiche-Ouananiche salmon.....						737	737
Salmo salar sebago-Sebago salmon.....	4,130					11,920	16,050
Salmo irideus-Rainbow trout.....					192,210	47,910	240,120
Salmo clarkii-Cutthroat trout.....		886,365	77,167			32	963,564
Salmo rivularis-Steelhead salmon.....			144,795	1,000	57,530	12,107	215,432
Salmo rivularis Kamloops-Kamloops trout.....		4,602,600	3,138,390			20	7,741,010
Oncorhynchus nerka-Sockeye salmon.....		3,364,094	12,420,194				15,784,288
Oncorhynchus kennerlyi-Kennerly's salmon.....			1,060,560				1,060,560
Oncorhynchus kiusuch-Coho salmon.....		1,063,053					1,063,053
Salvelinus fontinalis-Speckled trout.....	700	10,000	1,831,682	1,793,416	9,210,608	49,248	12,895,654
Cristivomer namaycush-Salmon trout.....			30,000	100,000	97,000		227,000
	4,830	9,929,112	18,937,788	7,965,615	24,749,464	244,971	61,831,780

In addition to the above 500,200 cutthroat trout eyed eggs and fry were purchased from the Cranbrook Rod and Gun Club and planted directly as follows:—

Arrow creek.. . . .	65,000	eyed eggs
Bott lake.. . . .	10,000	" "
Dunbar lake.. . . .	20,000	" "
Elk river.. . . .	100,000	" "
Fording river.. . . .	100,200	" "
Goat river.. . . .	100,000	" "
Paddy Ryan lakes	35,000	" "
Twin lake.. . . .	20,000	" "
Summit lake.. . . .	50,000	fry

The following classification of green eggs, eyed eggs, fry, advanced fry, No. 1 fingerlings, etc., applies to all statements and references in this report:—

Green eggs; eggs until they are "eyed."

Eyed eggs; eggs showing the eyes of the developing fish.

Fry; fish from date of hatch until free-swimming with the food sac fully absorbed. (No fry are distributed until the sac is fully absorbed).

Advanced fry; fry that are feeding systematically.

No. 1 fingerlings; fish that are feeding from two to eight weeks.

No. 2 fingerlings; fish that are feeding from eight to fourteen weeks.

No. 3 fingerlings; fish that are feeding from fourteen to twenty weeks.

No. 4 fingerlings; fish that are feeding from twenty to twenty-six weeks.

No. 5 fingerlings; fish that are feeding from twenty-six weeks to one year from date of hatch.

Inspections were continued with a view to locating waters where fish eggs might be obtained in sufficient quantities to warrant the establishing of collecting camps and also with a view to locating sites where the Fish Cultural Service might be extended advantageously to districts that are not readily accessible from existing hatcheries.

Experiments with equipment, methods and foods of various kinds were continued at several hatcheries. The experiments and the investigations in relation to fish cultural problems that were made by the Fisheries Research Board of Canada, formerly the Biological Board of Canada, are referred to in the board's report for 1937.

Some 2,700 suckers were destroyed in a trap operated in Sweltzer creek, British Columbia; and approximately 78.5 tons of ling, suckers, squawfish, carp and chub were destroyed in other parts of the Province during 1937. A large proportion of these fish were used for food at fur bearing animal ranches and the greater part of the balance was used as fertilizer. Over 10,300 coarse fish, mostly perch were destroyed in lake Annis, Nova Scotia. The trap loaned by the Department for this purpose was operated under the direction of the Superintendent of the Yarmouth hatchery by the owner-manager and those attending the boys' camp "Mooswa."

Sixteen main hatcheries, seven subsidiary hatcheries, three rearing stations, eight salmon-retaining ponds and several egg-collecting stations were operated in 1937. The output from these establishments was as follows:—

THE FOLLOWING TABLE SHOWS THE HATCHERIES OPERATED, THEIR LOCATION, DATE OF ESTABLISHMENT, THE SPECIES AND THE NUMBER OF EACH SPECIES DISTRIBUTED FROM EACH HATCHERY DURING 1937

Estab- lished	Hatchery	Location	Species	Green eggs	Eyed eggs	Fry	Advanced fry	Fingerlings					Year- lings and older	Total distrib- ution by species	Total distrib- ution by hatcheries
								No. 1	No. 2	No. 3	No. 4	No. 5			
1929	Antigonish	St. Andrews, N.S.	Atlantic salmon.				485,000	410,000			30,462		185	925,462	
			Rainbow trout.					20,000		17,512			14,023	37,697	
1876	Bedford	Bedford, N.S.	Speckled trout.				588,707	396,293			11,000			1,000,023	1,973,182
			Atlantic salmon.		3,000		332,000	595,000	19,450					949,480	
1937	Cobequid	Jackson, N.S.	Speckled trout.				410,000	912,480	42,855					1,365,335	2,314,815
			Atlantic salmon.				595,000	824,200						1,419,200	
1936	Grand Lake (I)	Wellington Station N.S.	Speckled trout.				351,845	402,058	59,122				27,997	813,025	2,232,225
			Atlantic salmon.				280,000	25,500			37,660	8,000		379,157	
			Quanniche sal- mon												
1912	Lindlof (a)	St. Peters, N.S.	Sebago salmon.					435,000					737	737	389,604
			Atlantic salmon.						425,834				9,710	890,834	
1937	Keimukuk (I)	New Grafton, N.S.	Rainbow trout.					21,500	4,335				77,698	77,698	938,532
			Atlantic salmon.					347,275	3,000					25,835	
1902	Margaree	N. T., Margaree, N.S.	Speckled trout.				1,180,000	481,000	665,000	19,857				370,132	395,967
			Atlantic salmon.					825,000	30,000	219,412			312	2,764,412	
1913	Middleton	Widdleton, Anne- polis Co., N.S.	Speckled trout.				45,000	305,000	1,096,675	180,000		99,979		1,397,457	4,161,869
			Atlantic salmon.				100,000	97,000						1,758,975	
			Salmon trout.				48,000	578,000	523,000	96,200				227,000	
1933	Nictaux Falls (d)	Nictaux Falls, N.S.	Speckled trout.						100,000	25,000				1,245,200	3,231,175
1929	Yarmouth	South Ohio, N.S.	Atlantic salmon.					578,000	70,000					335,100	335,100
			Rainbow trout.								210,100	16,000		532,500	
			Rainbow trout.										20	20	
			Speckled trout.										47,717	124,717	
			Sebago salmon.	(c) 4,130				195,000		135,000	21,800	14,000	32,398	1,358,198	2,015,435
1925	Chamcook lakes (b)	Charlotte Co., N.B.	Speckled trout.				50,000							4,130	4,130
1928	Florenceville.	Florenceville, N.B.	Atlantic salmon.					1,115,000	620,500	202,096				1,937,596	
1880	Grand Falls.	Grand Falls, N.B.	Speckled trout.	(c) 700				1,251,407		250	3,000		1,123	1,256,480	3,194,076
			Atlantic salmon.					315,000	1,430,072	480,277				2,175,349	
1874	Miramichi	South Esk, N.B.	Speckled trout.			567,296		775,966						1,343,262	3,518,611
			Atlantic salmon.				1,749,500	1,048,000	481,516					3,279,016	
1874	Restigouche	Flatlands, N.B.	Speckled trout.				633,299	152,000	22,300				50	336,350	3,665,366
			Atlantic salmon.				198,709	1,732,361	38,082					2,423,742	
1914	Saint John	Saint John, N.B.	Speckled trout.			209,386	680,000	215,000	4,694	390				408,095	2,831,887
			Atlantic salmon.										8	900,084	
			Rainbow trout.											2,210	
			Speckled trout.												
1906	Kelly's Pond	Southport, P.E.I.	Atlantic salmon.		10,000	145,000	285,000	886,000	94,000	42,000	38,000		2,210	1,500,000	2,402,302
			Speckled trout.				351,000	343,800	60,370					957,570	
1916	Cultus lake	Cultus lake, Ved- der Crossing, B.C.	Speckled trout.				1,000	325,300	83,515	30,940				440,755	1,398,325
			Cutthroat trout.	1,063,053		29,567								1,063,053	
			Kumloops trout.		36,325									65,892	
			Speckled trout.		170,000									38,140	
			Steelhead salmon.		74,400									3,023,190	
						144,705	1,000	23,840	33,690					203,323	5,155,860

THE FOLLOWING TABLE SHOWS THE HATCHERIES OPERATED, THEIR LOCATION, DATE OF ESTABLISHMENT, THE SPECIES AND THE NUMBER OF EACH SPECIES DISTRIBUTED, FROM EACH HATCHERY DURING 1937—*Concluded*

Estab- lished	Hatchery	Location	Species	Green eggs	Eyed eggs	Fry	Advanced fry	Fingerlings					Year- lings and older	Total distrib- ution by species	Total distrib- ution by hatcheries
								No. 1	No. 2	No. 3	No. 4	No. 5			
1927	Smiths Falls (a).	Cultus lake, Ved- der Crossing, B.C.	Cutthroat trout. Sockeye salmon. Steelhead trout.	.....	850 040 3, 289, 694	47 600 8, 869, 144	.....	.....	.....	.....	.....	.....	32	897, 672 12, 158, 835	.....
1934	Argenta (a).	Argenta, B.C.	Kamloops trout.	.....	.....	363 495	.....	.....	.....	.....	.....	.....	12, 107	2, 107	13, 068, 617
1933	Beaver lake (a).	Kelowna, B.C.	Kamloops trout.	.....	302 000	391 280	.....	.....	.....	.....	.....	.....	.....	363, 495	363, 495
1922	Lloyd's creek (a).	Kamloops, B.C.	Kamloops trout.	.....	2, 717 000	968 566	.....	.....	.....	.....	.....	.....	.....	693, 280	693, 280
1923	Nelson.....	Nelson, B.C.	Kamloops trout. Kennedy's salmon	.....	235, 000	750 829	.....	.....	.....	.....	.....	.....	.....	3, 683, 566	3, 683, 566
			Speckled trout.	.....	.....	1, 060, 560	.....	.....	.....	.....	.....	.....	.....	1, 060, 560	.....
1928	Penask lake (a).	Penask lake, via Quilchena, B.C.	Kamloops trout.	.....	795, 500	91 860	.....	.....	.....	.....	.....	.....	1, 342	87, 342	2, 047, 731
1928	Summerland (a).	Summerland, B.C.	Kamloops trout.	.....	383, 100	544 220	.....	.....	.....	.....	.....	.....	.....	887, 360	887, 360
				4, 830	9, 929, 112	18, 937, 788	7, 965, 615	15, 115, 992	6, 698, 449	1, 692, 510	1, 084, 534	157, 979	244, 971	927, 320	927, 320
														61, 831, 780	61, 831, 780

(a) Subsidiary hatchery. (d) Pond and rearing station combined.

(b) Collecting camp. (e) Autumn collection 1937. (f) Rearing station.

The eggs, fry and fingerlings included in this distribution, with the exceptions indicated, were from collections in the autumn of 1936 and the spring of 1937. In addition to the above 500,200 cutthroat trout eyed eggs and fry were planted in British Columbia waters as detailed in previous statement.

HATCHERY OUTPUT, BY PROVINCES, OF EGGS, FRY, FINGERLINGS, YEARLINGS AND OLDER FISH DURING 1937

	Green eggs	Eyed eggs	Fry	Advanced fry	Fingerlings					Yearlings and older	Total dis- tribution by species	Total dis- tri- bution by province
					No. 1	No. 2	No. 3	No. 4	No. 5			
<i>Nova Scotia—</i>												
Atlantic salmon.....		3,000	235,000	2,637,000	3,351,700	2,406,824	424,200	746,234	24,000	122,997	9,950,955	
Kamloops trout.....										20	737	
Ouaniche salmon.....										737	9,710	
Sabago salmon.....					20,000	77,698	17,512	57,000	20,000	47,902	240,112	
Rainbow trout.....			30,000	100,000	97,000						227,000	
Salmon trout.....			910,000	1,096,707	3,261,618	1,345,188	544,845	240,300	113,979	46,733	7,559,370	
Speckled trout.....												
		3,000	1,175,000	3,833,707	6,730,318	3,829,710	986,557	1,043,534	157,979	228,099	17,987,904	17,987,904
<i>New Brunswick—</i>												
Atlantic salmon.....												
Sabago salmon.....	4,130			3,082,799	4,425,361	2,574,864	632,763			2,210	10,715,787	
Rainbow trout.....										8	6,340	
Speckled trout.....	700	10,000	921,682	685,709	3,065,373	116,300	42,250	41,000		1,173	4,894,187	
	4,830	10,000	921,682	3,778,508	7,490,734	2,691,164	675,013	41,000		3,391	15,616,322	15,616,322
<i>Prince Edward Island—</i>												
Atlantic salmon.....				351,400	545,800	60,370					957,570	
Speckled trout.....				1,000	322,300	83,515	30,940				440,755	
				352,400	871,100	143,885	30,940				1,398,325	1,398,325
<i>British Columbia—</i>												
Coho salmon.....		1,063,053									1,063,053	
Cutthroat trout.....		886,365	77,167							32	963,564	
Kamloops trout.....		4,602,600	3,138,390								7,740,990	
Kennedy's salmon.....			1,060,560								1,060,560	
Sockeye salmon.....		3,364,094	12,420,194								15,784,288	
Speckled trout.....										1,342	1,342	
Steelhead salmon.....			144,795	1,000	23,840	33,690				12,107	215,432	
		9,916,112	16,841,106	1,000	23,840	33,690				13,481	26,829,229	26,829,229
											61,831,780	61,831,780

In addition to the above 500,200 cutthroat trout eyed eggs and fry were planted directly in British Columbia waters as detailed in a previous statement.

The Canadian National, The Canadian Pacific, Dominion Atlantic, Pacific Great Eastern and the Esquimalt and Nanaimo Railway companies continued their generous assistance and co-operation by furnishing free transportation for shipments of game fish and game fish eggs with their attendants. The extent of this co-operation is indicated in the following summary:—

Railway	Total mileage on trip passes	Number of passages	Mileage baggage car permits			Number of cases or cans			Number of permits
			Full	Empty	Total	Full	Empty	Total	
C.N.R.....	2,863	13	5,952	5,630	11,582	136	115	251	56
C.P.R.....	6,175	40	5,722	5,940	11,662	302	288	590	84
D.A.R.....	302	4	151	48	199	14	8	22	3
P.G.E.R.....	556	3	209	347	556	4	4	8	3
E. & N.R.....	106	3	164	164	328	7	7	14	4
	10,002	63	12,198	12,129	24,327	463	422	885	150

NOTE.—Number of passages refers to transportation one way—a return trip counting as two passages. Number of permits refers to one way passage for cases or cans.

The interest displayed by the general public in fish cultural operations has continued to increase and considerable assistance was tendered in disposing of the season's output by private individuals and local organizations such as Fish and Game clubs, Angling and Protective associations, Boards of Trade, Service Clubs, etc. The Fredericton Branch of the New Brunswick Fish and Game Association purchased a truck for the purpose of assisting in the distribution of hatchery product in the waters in which the club is interested. The New Glasgow, Nova Scotia, Fish and Game Club was also among the most active in assisting the hatchery officers in their work in that district.

An exchange of Kamloops and speckled trout for salmon trout eyed eggs was made with the Department of Game and Fisheries, Toronto, details of which are given in a subsequent statement.

In continuation of the experiment in regard to the influence of environment versus heredity on Atlantic salmon referred to in previous reports some 227,500 fingerlings, the progeny of "early" fish taken at New Mills, Chaleur bay, were distributed in the Saint John river and its tributaries; 28,200 from the Florenceville hatchery and 199,300 from the Grand Falls hatchery.

Over 468,000 Atlantic salmon fingerlings including some 59,000 yearlings and some two-year fish distributed in waters of the Maritime Provinces have two fins missing, viz., the adipose and one pectoral or one ventral fin. A fair proportion of the New Mills stock distributed in the Saint John river are included in this number.

The recapture of these marked salmon will add to present data in regard to the "homing" theory, sea movements or migrations and the influence of heredity versus environment in relation to the Atlantic salmon of Canadian streams. One dollar will be paid for scales and scars left by the removal of the fins from each recaptured marked salmon together with particulars as to its length, weight and place of recapture.

Selective breeding of speckled trout practised in the maritime hatcheries continues to give satisfactory returns resulting in the establishing of earlier spawning fish and an increased yield of eggs per female stripped. Increased production of trout eggs in 1937 over 1936 and 1935 per female stripped occurred at the following hatcheries: Antigonish in yearlings; Margaree in yearlings, two and four year olds; Florenceville in yearlings and Saint John in two and four year trout.

Some 6,350 Atlantic parent salmon were obtained for fish cultural purposes and retained at the various ponds operated by this department in the maritime provinces. Of these 3,877 were purchased from commercial fishermen and 2,473 were taken in the departmental traps. The following is the average weight in pounds of salmon secured from various sources; in Nova Scotia: Margaree harbour, Inverness county, 12; Nictaux river, Annapolis county, 5.7; River Philip, Cumberland county, 15; Sackville river, Halifax county, 5. In New Brunswick: Miramichi river, Northumberland county, 8.5; Benjamin river, Restigouche county, 6.5; New Mills, Restigouche county, 13.5; Saint John harbour, Saint John county, 11. And in Prince Edward Island, Morell river, Kings county, 9.

All officers and fish culture representatives reported a heavy run of fall Atlantic salmon to the rivers, in fact one of the heaviest runs on record.

To ascertain the time of day or night that Atlantic salmon ascend the rivers of Nova Scotia to spawn, record was kept at the following ponds and with results as shown:—

Time	Sackville river	Nictaux river	River Philip
One hour before sunrise.....	4	0	35
Sunrise to 9 a.m.....	13	35	83
9 a.m. to 11 a.m.....	24	40	80
11 a.m. to 12.30 p.m.....	18	3	35
12.30 p.m. to hour before sunset.....	84	53	96
Hour before sunset to sunset.....	30	10	10
Sunset to hour after.....	16	0	17
Hour after sunset to hour before daylight.....	68	27	729
	257	168	1,085

The periods of capture were: Sackville, September 26 to October 29, Nictaux, May 21 to October 30 and River Philip October 7 to November 10.

The effect of hatchery operations is reflected in the sebago salmon that have been taken for fish culture purposes in the Chamcook lakes, New Brunswick, during the past two years. In 1935, five thousand two hundred and forty-one yearlings of this species were marked before they were distributed by the removal of the adipose and the right pectoral fins. During egg collecting operations in 1936, one hundred and two sebagos were caught in the hatchery trap. Of the total number of fish that were handled that year, 40 or 39 per cent were marked fish. During 1937, one hundred and seven sebago salmon were caught during hatchery operations and of this number, 26 or 24 per cent were marked fish. Their average length was 18 inches and their average weight about 2 pounds after they were stripped. The creek between the two lakes where the trap is operated is about 200 yards long and 10 feet wide. The salmon drop down into this creek from the upper lake and ascend thereto from the lower lake during their spawning migration. Although all the marked fish were distributed in the lower lake a considerable proportion of the recaptures were taken on their descent from the upper lake. The marked fish, 64 per cent and 24 per cent of the totals taken during these two years, suggests that the limited distributions of hatchery fish that are being made are going a long way towards maintaining sebago salmon angling in these lakes.

Although the total production of speckled trout eggs at the Maritime Province hatcheries was slightly less than it was in 1936, satisfactory increases were made at the Margaree hatchery, to 3,205,000 as against 1,932,000 in 1936; and at Florenceville to 2,392,000 as against 1,710,000 in the previous

year. An increased collection was also made at Hart lake for the Cobequid hatchery and initial collections were made at Folly Brook, Cobequid hatchery and McRae lake, Lindloff hatchery.

The most important precautionary measure that was undertaken by the Fish Cultural division during the past year was the treatment of Second river with all its tributaries from their sources to the Cobequid water supply dam, which is referred to in the report of that establishment.

A closed circulatory system was installed at Restigouche hatchery in 1937 for the purpose of gaining further information as to the value of such an arrangement in advancing incubation in hatcheries where the water supply is abnormally low or in other hatcheries where the fry carrying capacity is limited and it would be to advantage to have a portion of the annual hatch ready for distribution some time earlier than the remainder. In this experiment water passed from the head trough to a cluster of five hatching troughs, thence to a small trough from which horizontal gutters extended so as to distribute the water over the surface of a sand filter and prevent disturbance of the sand surface. After passing down through the filter the water was conducted by a pipe to the foot tank, from there it was pumped to the head trough, thus completing the circulation. The system was started on February 1 with 250,000 Atlantic salmon semi-eyed eggs, in five troughs of 50,000 each. Minimum-maximum temperature readings were taken at 8.00 a.m., 1.00 p.m. and 7.00 p.m. daily of the water in the head trough of closed system, of water near head of hatching troughs in regular system and of air in hatchery. The water in the closed system was from 5 to 22° warmer than in the ordinary hatching system and averaged 14.1° warmer over the entire period of the experiment, that is, February 1 to May 8.

Hatching began in the closed system on March 8 and was completed on the 13th, whereas the ordinary system did not begin to hatch until May 12 and did not finish until May 24. The loss of eggs in the closed system until all were hatched was smaller than in the regular system up to the same stage.

The closed system worked well until hatching began, when so much trouble was experienced in keeping the filter (later supplemented by a settling tank) clean that the experiment had to be brought to a close on May 8, although the number of fry being carried was reduced to 100,000 towards the end of April and further reduced to less than 20,000 during the early part of May.

In co-operation with the Dominion Forest Service stream improvement on a small scale was initiated by the building of V dams in Burpee brook in the Acadian Forest Experimental station area near Fredericton, N.B. Prior to the building of the dams the stream was inspected from biological, fish cultural and engineering points of view and further inspections will be made from time to time to determine the effect and if the cost of the dams is justified by the improvement in the stream as a habitat for trout.

Similar work was also undertaken on a small scale in Lenihan brook in the Upper Golden Grove district twenty miles from Saint John by the Saint John Branch of the Provincial Fish and Game Protective Association. The location of the structure in this instance was determined on the advice of departmental officers.

In August, 1934, lake Jesse, Yarmouth county, N.S., was treated with copper sulphate for the purpose of killing undesirable fish and Tedford and Boar's Back lakes in Yarmouth and Digby counties respectively were treated similarly in August, 1936. The three lakes mentioned were originally speckled trout waters but the natural balance had become so upset that the speckled trout, the only species sought after by anglers, had practically disappeared.

The species composition of the fish killed by the copper sulphate treatment, the numbers, and the number and pounds of fish per acre for each lake is shown in the following statement (Smith, M.W. Prog. Rept. Atl. No. 20, 1937):—

Species	Boar's Back (55.8 acres)			Tedford (52.0 acres)			Jesse (45 acres)		
	No. in lake	No. per acre	Lbs. per acre	No. in lake	No. per acre	Lbs. per acre	No. in lake	No. per acre	Lbs. per acre
Speckled trout.....	23		0.1				29	1	0.4
Golden shiner.....	1,071	19	0.4	7,922	152	2.7	2,611	58	2.0
Creek chub.....							22		
Common sucker.....	364	7	8.1						
Catfish or bullhead.....	2,114	38	4.1	1,691	33	5.5	1,179	26	5.1
Eel.....	293	5	0.2	2,822	54	2.3	1,095	24	0.7
Killifish.....	1,275	23	0.2	42,621	820	5.8	10,098	224	1.6
Yellow Perch.....	22,630	406	3.9	7,383	142	2.0	14,177	315	4.6
White Perch.....				23,726	456	17.7	5,781	128	5.5
Nine-spined stickleback.....				52	1		11		
Totals.....	27,770	498	17.0	86,217	1,658	36.0	35,025	776	19.9

Food organisms, which had been largely destroyed by the copper sulphate, had returned in sufficient quantities to lake Jesse by the spring of 1936 to warrant the introduction of speckled trout and the lake was stocked with that species in 1936 and 1937. Trout that were planted as fry in 1936 (Smith) had reached a length of from six to eight inches by May 1937, and the Superintendent of the Yarmouth hatchery reported that there was evidence of trout in all parts of the lake when he visited it at that time.

Chemical and biological conditions were so promising (Smith) in Tedford and Boar's Back lakes in September, 1937, that it is confidently expected that both lakes will be suitable for stocking with speckled trout fry in the spring of 1938.

This year property was secured on the south branch of the Charlo river, Restigouche county, New Brunswick, for the construction of a modern salmon and trout hatchery with rearing and brood pond facilities. When this "Charlo" hatchery is built it will replace the old hatchery now at Flatlands in the same county.

Two new rearing establishments were constructed in 1937, one at Cardigan, Kings county, Prince Edward Island, and the other at Coldbrook station, Kings county, Nova Scotia. Each consists of a bungalow 21 feet by 28 feet 2 inches for the officer-in-charge, a combined garage and icehouse 21 feet by 39 feet with built-in cold storage room, and dam and pipeline to the ponds, which are circular with 25 foot diameter. All ponds were lined with heavy clay to prevent leakage and then with gravel and sand. The pipeline is made of 12-inch wood stave pipe with 2½-inch branch pipes to each pond separately. The bungalow provides a living room, kitchen and two bedrooms. The second building provides a garage with workroom space, icehouse, feed room and cold storage room with storage space for equipment on the second floor. The cold storage room measures 7 feet 6 inches by 8 feet and is insulated with 6 inches of corkboard. Galvanized iron retorts are fitted overhead to provide for ice and salt refrigeration. A small galvanized iron box inserted in one wall of the storage room provides space for holding prepared fish food. Cardigan has 24 ponds and Coldbrook 16. These will be in operation in 1938.

MARITIME PROVINCES EASTERN DIVISION

District Supervisor of Fish Culture, James Catt

Gratifying progress in fish culture was made this year in the Eastern Division. Two new plants, the Cobequid hatchery and the Kejimkujik rearing ponds, permitted an increased and more effective distribution of speckled trout and Atlantic salmon in the districts.

Fall fingerlings distributed from Yarmouth hatchery in Lake Kejimkujik in October 1936, were well grown and in excellent condition when recaptured in April and May 1937. Some of these fish had travelled many miles, crossing the lake, descending the Liverpool river and ascending its tributaries.

Rairdon brook, Kings county, New Brunswick, carries a stunted race of speckled trout that average about 0.8 ounce in weight and 5 inches in length. Some spawn when only $3\frac{1}{4}$ inches in length and rarely is one taken over 7 inches. In October, 1935, a number of these were captured and transferred to the Saint John hatchery where they were given all the food, principally liver, that they would eat. By October, 1936, they had increased in weight to 3.7 ounces and in length to $9\frac{1}{4}$ inches. This stock was marked by the removal of the right pectoral fin and distributed November 26 and 28, 1936—300 in Ping Pong lake and 364 in Beaver lake.

In 1937 thirty-six marked fish were caught in Beaver lake. They showed a good growth, ranging up to 11 inches in length. Two of the fish had descended the Beaver lake stream to Mispec river and were taken $2\frac{1}{2}$ miles from point of distribution. Others were taken in the lake $1\frac{1}{4}$ miles from place of liberation so that the maximum range of spread was $3\frac{3}{4}$ miles. It is claimed that these marked fish were better fighters than the native stock. In Ping Pong lake some 21 marked fish were taken, ranging up to 12 inches in length. The largest weighed $\frac{3}{4}$ pound; 7 taken in late May averaged $11\frac{1}{4}$ inches in length and $10\frac{1}{2}$ ounces in weight. This lake has no outlet and the fish are evenly distributed through it. The marked fish were very active, rising readily to a surface lure.

The introduced marked fish are taking on the appearance of the fish native to each lake. The results of this experiment goes to show that stunted and small speckled trout attain normal size and growth if transferred to suitable environment with ample food.

Interesting information was obtained from the liberation and recapture of marked speckled trout fingerlings and older fish, although it is regretted that reports in this connection are difficult to obtain from anglers.

The best record of recaptures, listed hereunder, was obtained from the Antigonish area and shows over 10 per cent of marked fish recaptured. Those fish taken in the salt water in Antigonish harbour had descended the West river—they could not be distinguished from the sea trout inhabitants of the district except by the marking.

Water	Number marked-fish liberated	Number recaptured
Copper lake.....	500	87
South river lake.....	1,000	32
Stewart dam on tributary to Little Harbour.....	1,125	113
Long lake—East River St. Mary.....	3,100	31
Donahue lake.....	1,000	178
James River lake or McLean lake.....	500	228
Cooee Coffre lake.....	1,000	458
Sherbrook lake.....	1,200	231
Simon lake.....	690	23
Campbell lake-River John.....	900	24
West river.....	2,465	16
Antigonish harbour		6

From the fish liberated in Coocce Coffre lake, 76 were caught in Sand lake, 87 in Pan Handle lake, 16 in Cole Harbour river and the balance in Coocce Coffre lake.

From the fish liberated in Sherbrook lake, 25 were caught in the stream running from the lake to the river, one in St. Mary's river, and a number in Thud lake about three miles above Sherbrook lake.

The co-operation of the administrative branch of the department, the Fisheries Research Board of Canada, the Provincial governments of Nova Scotia and New Brunswick and the several branches of the fish and game protective associations has, as in the past, assisted the fish cultural staffs in many ways.

The local branches of the fish and game protective associations rendered valuable assistance in the distribution of hatchery stock. The representatives of the various branches were also able to supply definite information in regard to the lakes and streams in their districts as discussed at the meetings called by the Supervisors of Fisheries.

The copper sulphating of Boar's Back lake last year was continued in 1937 in the stillwater below the lake. This work was carried out successfully by the Yarmouth hatchery staff together with the assistance of Yarmouth Fish and Game Protective Association. The experiment at Lake Jesse, Tedford and Boar's Back lakes is being watched with great interest by local residents and sportsmen.

Representative series of the fish produced at the Maritime Province hatcheries were exhibited at various exhibitions or contributed to exhibitions made by fish and game protective associations. Similar contributions were made towards the Nova Scotia and New Brunswick provincial exhibits at the Sportsmen's Shows at Boston, Hartford and New York. These are referred to more fully in the reports of the hatcheries from which the fish were drawn.

ANTIGONISH HATCHERY

K. G. Shillington, Superintendent

In spite of heavy losses due to high temperature a fair distribution of speckled and rainbow trout and Atlantic salmon was made. The storage dam constructed at the outlet of Loch Katrine in 1935 proved a valuable asset to this hatchery during 1937. Although the weather during the summer months was hot and dry the presence of this dam made available an ample supply of water at all times.

The walls of six long concrete ponds were repaired and two steel rails were placed across twelve ponds for support to take the place of the iron brace rods. The removal of these rods was an improvement to the ponds as it facilitated cleaning as well as the capture of fish. Additional improvements were made to the verandah of the residence and to the grounds.

The total collection of speckled trout eggs made from the brood stock developed at this hatchery was 7,795,176. Due to the selection of progeny from early spawning trout, the brood stock spawned early at this establishment—only a small number being spawned as late as December. Yearlings from selected stock yielded an average production of 685 eggs per fish in 1937 as compared with 471 in 1936. Some 146 yearling trout from one group which were spawned on November 25 yielded 150,436; a remarkable yield of over 1,000 eggs per fish. From April 13 to 17 the hatchery ponds produced 254,150 rainbow trout eggs.

An attempt was also made this season to collect rainbow trout eggs at Giant's lake. The trap was installed at the outlet of the lake but the number of rainbows captured was only 10, from which 12,650 eggs were secured.

In February, 10,200 speckled trout eyed eggs were received from the Florenceville hatchery, and in April, 1,000,000 Atlantic salmon eyed eggs from the Cobequid hatchery; on October 27 some 75,428 speckled trout green eggs were received from Lindloff hatchery. Outgoing shipments of eyed eggs to other hatcheries were: Speckled trout, 500,000 to each of Bedford, Lindloff, Yarmouth, Florenceville, Grand Falls, Miramichi, Restigouche and Saint John hatcheries, and 50,000 to Kelly's Pond; rainbow trout, 100,000 to Lindloff. An exchange of 320,000 speckled trout eyed eggs for salmon trout was made with the Department of Game and Fisheries, Toronto; the salmon trout eggs being allotted to the Middleton hatchery. Distributions for the season were: Atlantic salmon 925,462, rainbow trout 37,697 and speckled trout 1,010,023; total 1,973,182. A total of 12,403 speckled trout yearlings, two years and older fish were marked by the removal of the adipose and right pectoral fins and distributed in various waters in the district.

BEDFORD HATCHERY AND SACKVILLE RIVER SALMON POND

George Heatley, Superintendent

All salmon and trout were distributed in the advanced fry and fingerling stages and completed early in July as experience has shown that conditions at this plant are not favourable for retention of fingerlings for a longer period. A donation of some 3,000 Atlantic salmon eyed eggs was made to Dr. Hayes, Dalhousie University, Halifax, for experimental work and investigation. Adult Atlantic salmon retained at the hatchery from fall 1936, speckled trout old fish from Antigonish hatchery and adult salmon and speckled trout from Yarmouth hatchery together with the services of Assistant J. M. Butler were loaned the provincial Department of Highways, Nova Scotia, in connection with their exhibit at the Sportsmen's Shows at Boston, Hartford and New York.

In March 500,000 Atlantic salmon eyed eggs were received from the Miramichi hatchery, and 500,000 speckled trout eyed eggs from the Antigonish hatchery. During the months of May and June, 400,000 Atlantic salmon advanced fry were transferred to Grand lake rearing ponds to be later distributed from that establishment. On June 15 some 12,860 sebago salmon No. 1 fingerlings were also transferred to the above ponds. The following supplies of eggs were received in the fall of the year: Atlantic salmon 728,400 from Sackville pond and 2,690,400 from River Philip; sebago salmon 7,000 from Grand lake ponds and 34,000 collected from wild fish taken at Fletcher's run and Rawdon river, Grand lake.

The distributions made during the year were: Atlantic salmon 949,480 and speckled trout 1,365,335; total 2,314,815.

The appearance of the hatchery and grounds was greatly improved by painting and minor repairs.

As in the previous year a great many grilse were caught in the trap at Sackville pond. The number of salmon impounded for fish cultural purposes was 248, nine being liberated at the head of the tide when taken as they showed signs of net injuries. The first fish was captured on September 26 and the last on October 29. Of the fish retained, there was a normal loss of 7 or 2.8 per cent. The total collection of eggs 728,400 were laid down in the Bedford hatchery. The number of salmon tagged, by attaching tags to the dorsal fin, was 239.

COBEQUID HATCHERY AND RIVER PHILIP SALMON POND

J. W. Heatley, Superintendent

The young fish produced at Cobequid hatchery in 1937 were wholly the progeny of ova collected from wild fish.

In addition to ova laid down in the fall of 1936 some 1,000,000 speckled trout eyed eggs were received from the Grand Falls hatchery on March 10. This stock was from collections made in the fall of 1936 at Fraser's pond, Three brooks, and it was the intention to retain some 65,000 of this variety as a nucleus for brood stock. They kept healthy during the first part of the summer but due to a gill infection which they contracted while being held in crates in River Philip during the treating of the Cobequid hatchery water supply, it was decided to liberate them as soon as the infection was remedied.

On April 5, one million Atlantic salmon eyed eggs were shipped to the Antigonish hatchery.

Although the circular ponds lined with "fibreen" and clay appeared quite firm when first put in use it was found that later they become soft and gave considerable trouble when fish were being handled. During the year additional improvements were made to the hatchery grounds, a riprap of concrete and rock was placed at the end of the main drain from the circular ponds, and a Fairbanks-Morse automatic home water system was installed in the basement of the dwelling.

After careful consideration, it was decided to destroy by the use of drugs the fish in Second river and its tributaries in order to assure a water supply uncontaminated by any disease from wild fish. The work of cutting trails, placing screens in the tributaries and building crates for the retention of fish commenced about the middle of July. The destruction of fish was carried out successfully under the direction of Doctors R. H. McGonigle and M. W. Smith of the Atlantic Biological Station, Saint Andrews. All pipe lines, ponds, troughs and equipment were also thoroughly disinfected.

While the collection of wild trout eggs at Hart lake in 1936 was disappointing, reports from anglers who fished the lake during the summer of 1937 were encouraging and indicated that a fairly large number of speckled trout were in evidence in the lake. It was, therefore, decided to attempt a further collection in the fall of 1937. Accordingly a trap was installed in the inlet stream at the head of the lake on October 16 and pontoons were moored in the brook. The first fish was taken on October 16 and the last on November 9. The number captured was 816, consisting of 388 females and 428 males. The average size of these trout was considerably greater than last season, averaging three-quarters of a pound in weight, and the average yield of eggs per female was 1,036 as against 665 in 1936. The number of eggs collected was 380,550. With a view to ascertaining if the same fish will spawn again next season, 811 were marked by the removal of the adipose fin and returned to the lake. A small collection of 4,500 speckled trout eggs was also made from 96 trout captured by dip-net on November 30 at the outlet of Folly lake. This small collection may be attributed to some extent to the proportion of only 16 females to 80 males. The average weight of these fish was one-half pound.

In November, 2,536,900 Atlantic salmon eggs were received from the River Philip pond.

Evidence of the public's interest in the work carried on at this establishment is shown by the great number of visitors during the year.

Distributions for the season were: Atlantic salmon 1,419,200 and speckled trout 813,025; total, 2,232,225. Of the above 23,000 speckled trout No. 3 fingerlings were marked by the removal of the adipose and right ventral fins.

Preparations for the run of Atlantic salmon commenced at River Philip on September 15, consisting of repairs to the old power dam and canal and the installation of the trap. On October 5 Assistant C. E. Harding from the Yarmouth hatchery arrived and took charge of the operations. The first fish was taken on October 7 some twelve days later than in 1936, which was due probably to low water conditions that existed. However, by November 10 a total of 1,085 salmon were captured which was more than sufficient for the number of eggs required. The fence was then opened and the balance of the run allowed to ascend through the dam. There appeared to be a large number of salmon still ascending the river, and there is no doubt but that a considerably greater number of eggs could have been secured, if desired. The loss of fish during retention was 4. Of the fish impounded, 613 females and 324 males were stripped and the remainder liberated above the dam. The collection was 5,227,300 salmon eggs, of which 2,690,400 were laid down at the Bedford hatchery and the balance at the Cobequid hatchery. The number of salmon tagged in 1937, by attaching tags to the dorsal fin, was 44.

GRAND LAKE REARING PONDS

E. Barrett, Officer in Charge

The rearing ponds at Grand lake were successfully operated during 1937.

At the commencement of the calendar year there were some 800 ouananiche yearlings, 65 two year and 14,420 fingerling sebago and 36,000 Atlantic salmon fingerlings in these ponds. To determine whether sebago salmon, captured from Grand lake, could be held in ponds for spawning purposes thirty-five were retained in the fall of 1936 and were carried through the winter without loss. Up to the latter part of June there was a loss of 10 probably due to injuries received when jumping against the supply trough. By the middle of August however only 3 remained—2 females and 1 male—but these did not reproduce. Twelve additional fish captured in the fall of 1937 are being held in the pond as a further experiment.

Some 17 of the female pond-reared sebago salmon were stripped and produced 8,500 eggs. The average weight of these fish was one and a half pounds. Seven thousand of these eggs were laid down at the Bedford hatchery and 1,500 in a trough set up in the supply trough at the head of the ponds at Grand lake. Parent fish caught in the traps operated at Fletcher's run and Rawdon river were impounded in the Grand Lake ponds and stripped. The number of salmon taken from these traps was 62, sixteen from Fletcher's run and forty-six from Rawdon river. The first fish was taken on September 29 and the last on November 26. The average weight was two and a half pounds. The number of eggs produced was 38,000, of which some 34,000 were laid down in the Bedford hatchery and 4,000 in a trough at Grand lake. The loss of fish during retention was three. After stripping forty-seven of these fish were marked by the removal of the adipose and right ventral fins and liberated in Grand lake. The remaining twelve were retained in the Grand lake rearing ponds.

Six circular ponds, each twenty-five feet in diameter, commenced during the year are practically completed. A concrete bulk head was placed under the supply trough, between ponds number one and number two. Pond number one which was out of commission due to leakage previous to repairs is now available for the retention of parent fish.

In the latter part of May and the first of June, 400,000 Atlantic salmon advanced fry and on June 15 some 12,860 sebago salmon No. 1 fingerlings were received from Bedford hatchery and placed in the ponds, to be later distributed in waters of the district. With the exception of plantings in Grand lake, distributions were carried out with the assistance of the Bedford hatchery staff.

Output for the season was: Atlantic salmon fingerlings and yearlings 379,157, ouananiche two years 737, and sebago yearlings and three years 9,710; total 389,604. Thirteen thousand Atlantic salmon yearlings were transferred to the Bedford hatchery where they were marked by the removal of the adipose and right ventral fins, before being distributed. Some 9,010 sebgos and 737 ouananiche were marked by the removal of the adipose and right ventral fins and distributed in Grand lake.

KEJIMKUJIK REARING PONDS

F. F. Annis, Officer in Charge

The rearing ponds at Kejimkujik were operated for the first time in 1937. They received from Yarmouth hatchery 470,000 speckled trout advanced fry and fingerlings and 100,000 Atlantic salmon advanced fry which made satisfactory growth until high temperatures and low oxygen content of the water supply made distributions necessary. The output was: Atlantic salmon 25,835 and speckled trout 370,132; total 395,967.

Many improvements were made to the grounds during the year and a mink proof fence was constructed.

A large number of people visited the ponds and displayed a keen interest in this new undertaking.

MARGAREE AND LINDLOFF HATCHERIES

W. D. Turnbull, Superintendent

A record collection of speckled trout eggs amounting to 3,204,970 was made from the splendid brood stock developed at this hatchery. This collection shows a large increase over any previous year and is over 1,000,000 more than the collection of 1936. In 1937 a greater number of eggs than usual were secured from old fish. This increase in trout egg collection may to some extent be credited to the increased production of eggs per female stripped. The average yield on this basis from the fish of various ages compares, as follows: Yearlings 859 as against 551 in 1936, two years 1,041 as against 890 in 1936, three years 1,290 as against 1,087 in 1936 and four years 1,591 as against 1,216 in 1935.

An experiment to compare the quantity and quality of eggs from trout not fed for a given time with trout that were fed regularly was carried out. Fifty females and 50 males from two year old speckled trout stock were retained in a separate pond and not fed from August 1 until after spawning. The number of females stripped was 43 which yielded 38,915 eggs, an average yield per female of 905 eggs. The loss in these eggs to complete hatch was 11.4 per cent. From 516 fish of the same age and strain which were fed in a regular way 664,765 eggs were obtained; an average yield per female of 1,288 eggs. The loss in this latter group to complete hatch was 15.4 per cent.

Five new circular ponds commenced in 1936 were completed this season and put in use; a twelve-inch wood stave supply pipe was laid from a new intake box at the dam to convey water to the ponds; a box sluice was laid from the river to the head of pond number 23 to increase the flow of water through that series; a box sluice was also laid from pond number 22 to pond 20, and the breakwater at the head of ponds and above the intake boxes was repaired and extended. A new dwelling of the bungalow type 30 feet square with full basement was practically finished in 1937. It provides living room, dining room, kitchen, bathroom and one bedroom on the ground floor and 3 bedrooms on the second floor. A verandah extends across the front and a summer kitchen is provided at the rear.

Excellent reports have been received in regard to stocking done from this hatchery to lakes in the New Boston area. These lakes were closed to fishing for a period of three years and were first opened to the general public in 1937. On one holiday the Inspector of the district and his guardian counted some sixty cars at these lakes and fishermen appeared well satisfied with their catches. The lakes in the Sydney area, which were also closed to fishing, were opened for angling this season and provided satisfactory results. On August 30 at Old Bridge pool in the Margaree a salmon weighing $51\frac{1}{2}$ pounds was reported caught by an angler. Other rivers in Cape Breton also afford excellent salmon and sea trout angling.

In November and December 3,471,000 Atlantic salmon eggs were received from the Margaree salmon pond and laid down in the Margaree hatchery. Distributions for season were: Atlantic salmon 2,764,412 and speckled trout 1,397,457; total 4,161,869. Of the above 312 speckled trout old fish and 20,656 Atlantic salmon fingerlings were marked by the removal of the adipose and the right pectoral fins before being liberated.

Assistant Wm. T. Owens of the Saint John hatchery was in charge of the Lindloff hatchery in 1937. Notwithstanding the heavy loss that occurred in the speckled trout propagated at this establishment, satisfactory distributions of 77,698 rainbow trout and 860,834 Atlantic salmon fingerlings of good growth in the number one and two stages were made this season. Total output was 938,532. Repairs needed to the dam and flume were effected, and rearing facilities were increased by the construction of four new circular ponds. In April and May the following shipments of eyed eggs were received: 1,000,000 Atlantic salmon from the Miramichi hatchery, and 500,000 speckled and 100,000 rainbow trout from the Antigonish hatchery. An initial collection of 77,028 speckled trout eggs was made at McRae's lake. Trout were quite plentiful but of small size averaging one-quarter pound in weight. The eggs were laid down in the Lindloff hatchery for a short period and later 75,428 were transferred to the Antigonish hatchery.

MARGAREE SALMON POND

J. P. Chiasson, Superintendent

A new spawning shed and supply tank for spring water were constructed this year. As usual the salmon for fish cultural purposes at this point were purchased from commercial fishermen operating a trap-net in the mouth of the Margaree river. This net was operated between September 21 and October 27, but was lifted or closed to fishing between September 25 and 28, and from the afternoon of October 2 to 5 inclusive. The number of parent salmon secured was 515. The loss of fish during the retention period, which terminated when the last eggs were taken on December 6, was only 3. Some 3,471,000 eggs were taken and laid down in the Margaree hatchery. The number of salmon tagged, by attaching tags to the dorsal fin, was 33.

MIDDLETON HATCHERY AND NICTAUX SALMON POND AND REARING STATION

F. M. Millett, Superintendent

The 1937 distribution from the Middleton hatchery, almost double that of the previous year, consisted of Atlantic salmon, salmon and speckled trout fry, advanced fry and fingerlings.

Preparations for the taking of wild speckled trout ova at Sand lake, Annapolis county, began on October 27. Some 254 trout averaging one pound in

weight were captured by the use of a dip-net and barbless hooks from the above date to November 11 and from these 121,600 eggs were collected and laid down at the Middleton hatchery.

Owing to the unusual growth of algae, bulrushes, etc., which threatened to fill up the hatchery pond, steps became necessary to remedy the situation. Accordingly after the distribution was completed and fry were transferred to Stevens ponds, the pond was drained off and together with the stream leading to it coated with four tons of unslaked lime to check further growth of plant life.

During the retention period at Stevens ponds some 350,000 speckled trout fingerlings escaped through the upper barriers of the ponds to the Nictaux river system. To prevent further escapement of this nature the barriers at the head of the ponds were replanked and cemented. Special repairs made during the year consisted of: Interior of dwelling redecorated, exteriors of hatchery, ice-house and coal shed repainted, roofs of the last two named buildings reshingled, and the watchman's shack at Stevens ponds was given a coat of paint.

On March 2, 479,125 Atlantic salmon eyed eggs were transferred to the rearing station at Nictaux Falls and from there 1,340,000 fry and advanced fry were taken to Stevens ponds in May.

Eyed eggs received during the year were: In January 300,000 salmon trout from the Ontario Provincial Department of Game and Fisheries, via Belleville hatchery; in April 500,000 Atlantic salmon from the Miramichi hatchery, and in December 1,615,880 speckled trout purchased from the American Fish Culture Company, Carolina, Rhode Island, U.S.A. In the autumn 360,014 and 498,000 Atlantic salmon ova were received from the Nictaux and Saint John salmon ponds, respectively.

Distributions from the Middleton hatchery were: Atlantic salmon 1,758,975, salmon trout 227,000 and speckled trout 1,245,200; total, 3,231,175. Of the above 1,500 speckled trout and 5,300 Atlantic salmon fingerlings were marked by the removal of the adipose and left ventral fins.

The number of Atlantic salmon eggs collected at the Nictaux pond in 1937 was 360,014, some 154,000 less than in the previous year—although nearly the same number of parent salmon were secured both years. All eggs were laid down in the Middleton hatchery. The decrease may be attributed to a great extent to some 35 salmon retained in the power canal that did not ascend into the trap. These could not be captured as it was not feasible to drain the canal, which is used for power purposes. The racks at the head of the canal were removed and these salmon allowed to ascend the Nictaux river to spawn naturally. The number of salmon that ascended the fishway and were placed in the pond in 1937 was 168. The first fish was taken on May 21 and the last on October 30. The loss during retention was 9. The number of salmon marked, by affixing tags to the dorsal fin, was 124.

Operations at the Nictaux rearing station commenced this season on February 27. Salmon eyed eggs received during the year were: In February, 1,000,000 from the Yarmouth hatchery; in March, 479,125 from Middleton hatchery; and in April, 500,000 from the Miramichi hatchery. During the month of May 1,340,000 fry and advanced fry were transferred to Stevens ponds. The capacity of this plant was increased by three additional tanks and one trough. Angling in the Nictaux river was reported to be better this season than in the previous year. The total distribution from this rearing station was 335,100 Atlantic salmon fingerlings, of which 9,982 were marked by the removal of the adipose and left ventral fins.

YARMOUTH HATCHERY

H. V. Gates, Superintendent

Operations at the Yarmouth hatchery were influenced to a considerable extent this year by the unusual high temperatures that prevailed during the greater part of the rearing period, having a detrimental effect on fry and fingerlings as well as the brood stock retained at this hatchery. Distributions, which included nearly 175,000 yearlings, were the largest since 1932. The value of the selective breeding at this hatchery is still in evidence, the fry from selected parents withstanding the high temperatures much better than those from other sources.

Ova obtained from the hatchery ponds consisted of 150,000 speckled trout and 160,000 rainbow trout.

Live Atlantic salmon, rainbow and speckled trout of various ages reared at the Yarmouth hatchery were shown at the Nova Scotia Fisheries Exhibition and Fishermen's Reunion, Lunenburg, at the Yarmouth County Exhibition, Yarmouth, and at the Municipality of Clare Exhibition, Little Brook. Six speckled trout three-year olds and two adult salmon were allotted to the Provincial Government of Nova Scotia in connection with their exhibits at the Sportsmen's Shows at Boston, Hartford and New York.

In February 1,000,000 Atlantic salmon eyed eggs were transferred to the Nietaux Falls rearing station, and in May 100,000 Atlantic salmon advanced fry and 470,000 speckled trout advanced fry and No. 1 fingerlings were transferred to Kejimikujik rearing ponds.

Eyed eggs were received during the year, as follows: In February 500,000 speckled trout from Antigonish hatchery, and in December 1,513,500 speckled trout purchased from the American Fish Culture Company, Carolina, Rhode Island. In November 1,070,700 Atlantic salmon green eggs were received from the Saint John pond.

Distributions for the season were: Atlantic salmon 532,500, Kamloops trout 20, rainbow trout 124,717 and speckled trout 1,358,198; total 2,015,435. The marking of fish by the clipping of the adipose and right ventral fins was continued this year. The numbers marked were 68,030 speckled trout and 97,000 Atlantic salmon.

It was reported that speckled trout angling in the Carleton and Coldstream river systems and in Mersey river system above the dams was good.

FLORENCEVILLE HATCHERY

George Sutherland, Superintendent

The collection of 2,391,964 speckled trout eggs from the Florenceville ponds in 1937 was the largest ever recorded for this plant, and shows an increase of more than 682,000 over 1936. All eggs were laid down in the hatchery except 700 shipped to Doctor A. H. Leim of the Atlantic Biological Station at St. Andrews.

The auxiliary building to house the outside troughs was completed and operated this season, considerably increasing the rearing capacity of the plant. A garage was also built for the truck.

Live speckled trout fingerlings, old fish and Atlantic salmon fingerlings were loaned the Fredericton and Carleton branches of the New Brunswick Fish and Game Protective Association for their exhibits at the Fredericton and Woodstock Exhibitions, New Brunswick.

In February 10,200 speckled trout eyed eggs, the progeny from early spawners, were shipped to the Antigonish hatchery.

The following allotments of Atlantic salmon eyed eggs were received: In March 500,000 from the Saint John hatchery, and in April 30,000 from the Restigouche hatchery. The resultant fingerlings from this latter shipment were planted in the Nashwaak river in continuation of the experiment of introducing progeny from "early" run salmon to this stream. Most of these fingerlings were marked by the removal of the adipose and left pectoral fins. In April 500,000 speckled trout eyed eggs were received from the Antigonish hatchery. In the autumn 1,012,600 Atlantic salmon ova were received from the Saint John salmon pond. Distributions were: Atlantic salmon 1,937,596 and speckled trout 1,256,480; total 3,194,076. The number of fish marked at this hatchery by the removal of the adipose and left pectoral fins in 1937 was: 25,789 Atlantic salmon and 4,123 speckled trout.

GRAND FALLS HATCHERY

W. A. McCluskey, Superintendent

The hatch from Atlantic salmon eggs at the Grand Falls hatchery this season was all that could be desired. The fry were strong and healthy and developed into sturdy fingerlings. Distributions from speckled trout stock began early as there appeared to be a weakness developing in some of them. The trout fry and fingerlings distributed, however, were on the whole strong, large in size for their age and healthy. Every effort was made to comply with the numerous requests for fish received. Great assistance was rendered by the Grand Falls and Madawaska Fish and Game Clubs in planting fry and fingerlings in waters in which they are interested.

The four circular ponds constructed in 1936 operating for the first time proved a helpful addition to the rearing facilities at this plant; fingerlings thrived in these ponds and were of fine quality when liberated.

The collection of wild speckled trout ova at Fraser's pond, Three brooks, in the autumn was 1,165,640, which is somewhat smaller than that of the previous year. The eggs were laid down in the Grand Falls hatchery and 962,259 of them were purchased from the owner of the pond, when they had reached the eyed stage.

In March 1,000,000 speckled trout eyed eggs of the Fraser's pond stock were transferred to the Cobequid hatchery.

Also, in March 220,000 Atlantic salmon eyed eggs were received from the Restigouche hatchery, and in April 500,000 speckled trout from the Antigonish hatchery. In the autumn 2,510,750 Atlantic salmon ova were received from the Saint John pond. Distributions were: Atlantic salmon 2,175,349 and speckled trout 1,343,262; total 3,518,611. The marking of hatchery stock was confined to Restigouche salmon fingerlings and the number marked was 36,104. Of this number 10,000 were distributed in the Salmon river, 10,000 in the Tobique river and 16,104 in the Saint John river.

Large numbers of both salmon and trout are reported from time to time by guides, sportsmen and lumbermen as being seen on the spawning grounds in the Saint John river and tributaries.

MIRAMICHI HATCHERY AND MIRAMICHI SALMON-RETAINING POND

Frank Burgess, Superintendent

The distribution from the Miramichi hatchery in 1937 was 3,665,366, consisting of 3,279,016 Atlantic salmon and 386,300 speckled trout advanced fry and fingerlings, and 50 trout yearlings. Various allotments of Atlantic salmon eggs were sent to other hatcheries, as given below: To Bedford hatchery, 500,000; Restigouche, 1,000,000; Middleton, 500,000; Nietaux Falls, 500,000;

Lindloff, 1,000,000; United States Bureau of Fisheries, Craig Brook hatchery, 100,000, and the Ontario Department of Game and Fisheries, Mount Pleasant hatchery, 20,000. A shipment of 500,000 speckled trout eyed eggs was received in March from the Antigonish hatchery and 7,624,931 Atlantic salmon eggs in the fall from Miramichi pond. The marking of fish by the clipping of fins was continued at this hatchery this season with 16,700 Atlantic salmon fingerlings and 43 trout yearlings marked by the removal of the adipose and right ventral fins.

General repairs were effected, including reconstruction of a gravel filter above the hatchery dam and the building of a chimney for the storehouse.

Parent salmon for the Miramichi pond this season were purchased by tender and contract from the late summer run. Trap-nets were operated in the Northwest Miramichi river in the vicinity of the hatchery. The first fish was secured on September 8 and the last the 25th of that month. One thousand five hundred and eighty-nine salmon were impounded, in which there was a small loss of twenty-nine. The yield of eggs was 7,624,931, which were laid down at the Miramichi hatchery for incubation. The number of salmon tagged, by affixing tags to the dorsal fin, was 617.

NEW MILLS SALMON POND

Wm. White, Superintendent

Most of the Atlantic salmon for the New Mills pond were from the early run, and were purchased from the commercial fishermen of the district. The pond launch was assisted in towing the fish from the nets to the pond by the patrol boat *Gilbert*. Four hundred and forty-nine salmon were impounded between May 24 and July 19. An additional 63 were captured at Benjamin river between September 10 and 25, making a total of 512 salmon available for fish cultural purposes. There was a small loss of 8 in the fish purchased from the commercial fishermen, due to injuries received in nets, and one in those from the Benjamin river. The collection amounted to 1,743,974 eggs which were laid down in the Restigouche hatchery. The number of salmon tagged, by affixing tags to the dorsal fins, was 169.

The spawning shed equipped with two egg hardening tanks was rebuilt this year by the pond staff.

RESTIGOUCHE HATCHERY

R. O. Barrett, Superintendent

A slightly larger-than-usual distribution of Atlantic salmon and speckled trout fry and fingerings was made from this plant in 1937, including a greater distribution in the advanced fry and fingerling stages, namely, 2,622,451, as compared with 2,293,442 in 1936 and with 92,229 in 1935.

In March 1,000,000 Atlantic salmon eyed eggs were received from the Miramichi hatchery and 500,000 speckled trout eyed eggs from Antigonish hatchery. The following outgoing shipments of Atlantic salmon eyed eggs were made: 30,000 to Florenceville hatchery and 220,000 to Grand Falls hatchery. A further supply of 1,743,974 Atlantic salmon ova was received in the fall from the New Mills pond. Distributions for the season were: 2,423,742 Atlantic salmon and 408,095 speckled trout; total 2,831,837.

SAINT JOHN HATCHERY, SAINT JOHN SALMON POND AND CHAMCOOK COLLECTING STATION

J. D. Nichol, Superintendent

The usual distribution of fry, fingerlings, yearlings and older fish was made from the various species propagated at this plant.

The following collections of eggs at the hatchery ponds were made this season: Rainbow trout 5,000 and speckled trout 1,614,565.

Live speckled trout were loaned to the Bureau of Information and Tourist Travel for the Province of New Brunswick in connection with their exhibits at the Sportsmen's Shows, at Boston, Hartford and New York. The exhibit under the care of Assistant Wm. T. Owens was made up of 18 three year and 32 five year old trout. There was only a loss of two fish during these shows. The exhibit proved a great attraction. At the Saint John exhibition under the care of Superintendent Nichol were shown representative species as propagated at Saint John hatchery and also one male and one female Atlantic salmon. The Saint John branch of the New Brunswick Fish and Game Protective Association were also loaned for exhibit there 12 speckled trout fingerlings and 2 adult salmon. Atlantic salmon fingerlings, and rainbow and speckled trout of various ages were also loaned to the Moncton branch of the New Brunswick Fish and Game Protective Association for showing at the Moncton exhibition. The exhibit was under the care of Assistant N. J. Lamb of the Saint John hatchery.

In February 10,000 speckled trout eyed eggs and in June 2,500 trout No. 1 fingerlings were shipped to the Atlantic Biological Station, Saint Andrews. Some 10,000 Atlantic salmon eyed eggs were sent the Department of Game and Fisheries, Toronto for incubation in their provincial hatchery at Pembroke, Ontario. In March 500,000 Atlantic salmon eyed eggs were transferred to the Florenceville hatchery. Supplies of eggs from other sources in addition to collections were: In April 500,000 speckled trout eyed eggs from the Antigonish hatchery, and in the autumn 1,012,600 Atlantic salmon ova from the Saint John pond. Distributions for the season were: Atlantic salmon 900,084; rainbow trout 8; sebago salmon 2,210 and speckled trout 1,500,000; total 2,402,302. Of the above 15,000 speckled trout fingerlings were marked by the removal of the right pectoral fin and 2,210 sebago two years by the removal of the adipose and right pectoral fins. The marked speckled trout were distributed in Red Rock lake and the sebagos in Chamcook lake.

Commencing June 3 and ending July 25 Atlantic salmon for the Saint John salmon pond were accepted and impounded as caught. The number taken was 1,324, of which about one quarter were males. The loss was approximately 22.1 per cent. Notwithstanding the shortage of males a satisfactory collection of 6,104,650 eggs was obtained and laid down, as follows: In Middleton hatchery 498,000; Yarmouth 1,070,700; Florenceville 1,012,600; Grand Falls 2,510,750, and Saint John 1,012,600. At the request of the Bureau of Information and Tourist Travel for the Province of New Brunswick 12 parent salmon were transferred to and retained at the Saint John hatchery for future exhibition purposes. The number of salmon tagged, by affixing tags to the dorsal fin, was 20.

The collection of sebago salmon eggs at Chamcook lakes was under the direction of Assistant T. K. Lydon of the Saint John hatchery. The traps were placed in position on October 21 and operated until November 16. One hundred and seven sebagos were taken, 43 of which were females and 64 males. The yield of eggs was 73,210; of these 69,080 were laid down at the Saint John hatchery and 4,130 were shipped to the Atlantic Biological Station, Saint Andrews. The average length of the fish captured was 18 inches and the average weight two

pounds although two weighed two and a half pounds after stripping. Twenty-six seabags marked by the removal of the adipose and the right pectoral fins were captured, that is, 24 per cent of all fish taken were marked fish. These are returns of seabago yearlings that were marked and liberated from the Saint John hatchery in 1935.

KELLY'S POND HATCHERY AND MORELL RIVER SALMON POND

F. C. Hayley, Superintendent

On account of heavy freshets the collection of wild speckled trout eggs was not as large as last year. The number of eggs taken in 1937 was as follows: Fortune river 58,500, hatchery pond 5,000, Ing's pond 93,740, Andrew's pond 31,000 and York pond 178,200; total 366,440. Wild eggs independently collected are paid for on the basis of the number that reach the eyed stage. A trap was operated by the department at Fortune river where 158 sea-run speckled trout were captured between October 8 and November 27, and from which the collection above mentioned of 58,500 eggs was made. There was no loss of trout during retention at that point.

A new porch was built for the hatchery dwelling, repairs made to kitchen roof and all buildings repainted.

In February 50,000 speckled trout eyed eggs were received from the Antigonish hatchery. The resulting fingerlings from these eggs, amounting to 30,940, were marked by the removal of the adipose and left pectoral fins and liberated in Vessey brook, a tributary to Winter river. In November 2,475,280 Atlantic salmon ova from the Morell salmon pond, were laid down in addition to speckled trout eggs collected. Distributions for the season were: Atlantic salmon 957,570 and speckled trout 440,755; total 1,398,325.

The construction of rearing ponds this year at Cardigan (Buchanan's Mills) will greatly increase the rearing facilities of this district.

Operations at the Morell salmon retaining pond were in charge of Assistant I. A. Mowat of the Restigouche hatchery. Preparations for the taking of fish began September 23, consisting of driving piles, placing fence in position, setting net, repairing dam, etc. A good run of salmon occurred in the river. The first fish was taken on October 15 and last on November 17 and some 909, of which 350 were females and 559 males, were captured and impounded. The salmon were held without a loss and were liberated after stripping. A collection of 2,475,280 eggs was obtained and laid down in the Kelly's Pond hatchery. The number of salmon marked, by affixing tags to the dorsal fins, was 34.

WESTERN DIVISION

Under the conditions as outlined in the following Order in Council P.C. 2532 of October 12, 1937, the Department of Fisheries withdrew from fish cultural operations in the Province of British Columbia as from December 31, 1937:—

P.C. 2532

CERTIFIED to be a true copy of a Minute of a Meeting of the Committee of the Privy Council, approved by His Excellency the Governor General on October 12, 1937.

The Committee of the Privy Council have had before them a report, dated September 28, 1937, from the Minister of Fisheries, submitting as follows:—

While the administration of the fisheries in the non-tidal waters of the provinces and in Quebec in the waters that are above those that are navigable from the sea, is a provincial responsibility, certain fish that are of commercial importance when they are in the tidal waters ascend to the non-tidal waters to reproduce and, while there, are valuable sport fishes. Hence the protection of these fish, even when they are in the non-tidal waters, and

their increase by fish cultural activities are matters of Federal concern and hatcheries for the reproduction of such fish have been established in different provinces. To such extent as these hatcheries can also increase the supply of fresh-water sport fish without unduly interfering with the purpose for which they were established, they are so used. In British Columbia in years gone by, a number of hatcheries for the propagation of sockeye salmon were established. From time to time it was urged that these hatchery operations should be extended to include sport fish. As valuable sport fish in that province reproduce during the period of the year when the sockeye hatcheries would be closed for the season, the staffs thereof could largely be used to hatch sport fish if hatcheries at suitable places were available. Consequently, from time to time relatively inexpensive sport fish hatcheries were established as follows:—

Hatchery	Location	Description
Smiths Falls.....	Cultus lake, Vedder Crossing.....	Buildings cheaply constructed. Built of logs and cedar shakes obtained in vicinity.
Argenta-Lardo.....	Argenta and Lardo on Kootenay Lake.	Argenta-hatching troughs only covered during hatching season with temporary covering. Lardo-hatching troughs covered with roof supported on posts. Troughs below roof enclosed with wire netting.
Lloyd's creek.....	Lloyd's creek, Kamloops.....	Hatchery building and living quarters for staff. Buildings not suitable for winter use as season extends from late spring to mid-summer.
Penask Lake.....	Penask Lake-Quilchena district.....	Hatchery building and living quarters not suitable for winter use. Season extends from late spring until mid-summer. Hatching troughs not enclosed but protected by roof supported on posts.
Summerland.....	Summerland.....	Stone building formerly the Summerland Power Station.
Fish Lake.....	Fish Lake, Kamloops district.....	Trap and retaining enclosures for parent fish; troughs in which to eye eggs before planting or transferring them to Lloyd's Creek Hatchery; no permanent buildings.
Beaver Lake.....	Beaver Lake, Kelowna district.....	Traps and retaining enclosures for adult fish; hatching troughs provided with temporary seasonal covering; no permanent buildings.

Also, a few years ago the Provincial Government undertook more actively to administer the sport fisheries of British Columbia and extended such activities to sport fish culture.

Following the closing of the sockeye salmon hatcheries in the province at the end of last season, the situation became similar in British Columbia to that in other provinces where the propagation of sport fish is being left entirely to the provincial authorities.

In the light of the above and as dual services are undesirable, the question was gone into with the Provincial Minister concerned—the Attorney-General—who was informed that, subject to approval, if he were prepared to undertake full responsibility for sport fish development in the province the above listed hatcheries or any of them would be placed at the disposal of the province following the end of the operating season of this year.

He has now replied that the province feels that sport fish culture should be placed under provincial jurisdiction entirely and that his department will examine the above hatcheries and will be glad to have an opportunity of taking over such of them as can be usefully utilized.

In the circumstances, the Minister, on the advice of the Deputy Minister of Fisheries, recommends:—

- (1) That at the end of the hatching season of this year the Department of Fisheries shall discontinue sport fish hatching in British Columbia;
- (2) That such of the above listed hatcheries as the province may wish to utilize for hatchery purposes be transferred to the province without cost;
- (3) That should any of the above listed hatcheries not be so taken over they be disposed of to the best advantage.

The Committee concur in the foregoing recommendations and submit the same for approval.

(Sgd.) E. J. LEMAIRE,

Clerk of the Privy Council.

The following results from distributions of hatchery output in British Columbia made by the Fish Culture Branch of the Department are indisputable because the species listed were not present in the various waters before they were introduced. Results apparent in many other waters are equally satisfactory:—

Name and Location	First stocked	Species	Results
Manistee lake (Ferne District)...	1925	Kamloops....	Spring 1927 Kamloops trout average 24" long, 7½ lbs. weight. One fish 13 lbs. 1 oz. taken in September, 1927. Results very good in 1931.
Forbidden Plateau Lakes, (Court-enay, Vancouver Is.)	1929	Kamloops....	Trout averaged 3 lbs. in weight in 1932, some up to 6 lbs. in 1933. Natural spawning took place in 1933.
Snowshoe lake (tributary to Arrow lake) (Edgewood).	1926	Kamloops....	Trout up to 3½ lbs. by July 1928 and some specimens of 24 lbs. in 1933.
Jewel or Long lake (near Greenwood).	1925	Kamloops....	Trout of 13 lbs. 10 oz. taken in 1928; 44 lb. fish caught 1931. Very fair catches during September and October 1932.
Cahill lake (Slocan, B.C.).....	1925	Kamloops....	Trout up to 15 lbs. when dressed in 1931. Good fishing in 1932.
Box lake (near Nakusp).....	1925	Kamloops....	Trout 4 lbs. taken in fair numbers in 1932.
White Swan lake (Kootenay district).	1931	Kamloops....	Favourable showing Kamloops fingerlings in autumn 1931.
Haskins lake (Kelowna district)..	1927	Kamloops....	Trout 14 lbs. taken four years after first introduction. Seven-pound trout fairly numerous.
Kinney lake (Mt. Robson Park)...	1932	Kamloops....	Splendid showing of Kamloops fry fall 1932. Stocking reported very successful in 1934.
Beaver lake (Kelowna district)...	1926	Kamloops....	In 1929 fish were taken from 4 to 15 lbs. in weight. Large numbers 8 to 10 lbs. taken on fly; largest 18 lbs. Average catch about 3½ lbs. From 800 to 1,000 fish caught in 1932. Over 700,000 eggs collected for fish cultural purposes in 1934; over 900,000 in 1935 and 1936, and 1,330,000 in 1937.
Horseshoe lake (Cranbrook district).	1923	Kamloops....	Trout 3½ lbs. taken in 1928. Trout up to 13 lbs. taken by 1932.
Garibaldi lake (Pemberton district).	1928	Kamloops....	Trout up to 9 lbs. in weight caught in 1933. Some natural spawning.
Rock lake (Cranbrook district)...	1923	Kamloops....	Source of egg supply for Cranbrook in 1925. Results reported good in 1929 and 1931.
Lake O'Hara (27°17' W. 5).....	1926	Rainbow.....	Trout over 2 lbs. in weight caught in 1930. Lake reported as teeming with various sized fish in 1931, up to over 2 lbs. in weight. In 1933 they were 2½ lbs.
Lillian lake (near Nelson).....	1929	Rainbow.....	Trout reached from 2 to 3 lbs. 1½ years after stocking, and up to 7 lbs. by May 1932. Good results in 1936.
Cooper lake, on Moyie river.....	1925	Cutthroat....	Cutthroat trout 15" long by 1932.
Paul lake (near Kamloops).....	1909	Kamloops....	First collection of eggs for hatchery purposes, nearly 800,000 made in 1922. Now supplies approximately 1,000,000 eggs annually, of which 250,000 are returned to the lake, leaving the balance for other waters. Approximately 6,000 trout are taken annually in this lake. Dr. Mottley estimates that in addition to the sport furnished residents, non-resident anglers leave approximately 10,000 dollars yearly in the district.
Cowichan area (Vancouver Island)	1932	Brown trout..	Five male brown trout taken in Beadnell creek in advanced spawning condition 1934. Two taken at Duncan, one at Saltham, all 14½ inches, 1935. Fish up to 4 lbs. taken in 1936 in Cowichan lake. Natural spawning took place in Oliver creek in 1935.
Little Qualicum river (Vancouver Island).	1933	Brown trout..	Trout 9 inches long, 1934. Several specimens up to 1½ lbs. taken.
Wilson lake (near Nakusp).....	1922	Kamloops....	Specimens up to 15 lbs. caught in 1932. Fishing good in 1933 as result of natural spawning. Conditions most satisfactory in 1936.
Cowan lake (Penask lake district).	1931	Kamloops....	6½ lb. fish taken in 1935.
Peter Hope lake (near Merritt)...	1932	Kamloops....	6 to 7 lb. fish caught in 1934; 10 lb. common in 1935, while one was reported 17½ lbs.
Jones lake (Hope district).....	1924	Kamloops....	Excellent supply of beautiful trout up to 18 lbs. in 1936.
Peterson lake (Nicola Valley)....	1931	Kamloops....	Produced fish up to 6½ lbs. in 1935; 4 lb. fish in good numbers.
Jackson lake (Nicola Valley).....	1931	Kamloops....	Produced fish up to 6½ lbs. in 1935; 4 lb. fish in good numbers; good fishing 1936.
Neveu lake (Nicola Valley).....	1928	Kamloops....	Produced fish up to 6½ lbs. in 1935; 4 lb. fish in good numbers; good fishing in 1936.
Pinantan lake (near Kamloops)...	1908	Kamloops....	Provides excellent fishing. Has been a source of eggs for Lloyds Creek hatchery since 1923 yielding as an average nearly 600,000 Kamloops eggs annually.
Evans lake (Squamish district)...	1936	Kamloops....	Trout weighing 7 ounces and 10½ inches long caught in September, 1937.
Premier lake (near Cranbrook)...	1915	Kamloops....	Fish 25 to 42 lbs. have been taken.
Murtle lake (Blue River district).	1928	Kamloops....	Remarkable results; now an abundance of good sport fish 1936. 126,862 eggs taken from 30 female fish in 1936.
Kathlyn lake (Smithers).....	1925	Kamloops....	Kamloops trout up to 12½ lbs. caught in 1932.
McConnell lake (Kamloops district).	1935	Kamloops....	Excellent fishing in 1937.
Hyas (Long) lake (Kamloops district).	1923	Kamloops....	Excellent results. Fish 2 to 5 pounds.
Weaver lake (Harrison lake district).	1919	Kamloops....	Excellent fishing in recent years.
Cartwright lake (near Brisco)....	1935	Kamloops....	Several hundreds of Kamloops trout in good condition 10 to 16 inches long were seen in 1937.
Marble lake (West Kootenay district).	1932	Cutthroat....	Good catches made in 1937.

Sport fishing in Paul, Pinantan, Knouff and Fish lakes in Kamloops district was excellent this season, and anglers were well satisfied with their catches.

An increased number of fishermen visited Beaver lake in the Kelowna district during the year where there is an abundance of sport fish.

As available information indicates that runs of sockeye salmon have never occurred in the streams of the easterly coast of Vancouver Island south of Seymour Narrows, a survey of the Nanaimo river system, with a view to ascertaining whether or not a sockeye run could be established there, was undertaken in 1932. As far as could be determined from a short summer investigation, physical conditions were found to be reasonably suitable for sockeye salmon production, but there were two adverse biological factors in an apparent paucity of plankton and a large trout population. Following this survey an experimental planting of eyed sockeye salmon eggs from the Rivers Inlet hatchery was made in the Nanaimo system in March, 1933. These eggs were collected in the autumn of 1932, and as the Rivers Inlet sockeye are predominantly four-year and five-year fish, any returns that might result from the experimental planting should make their appearance in 1936 and 1937. For the purpose of ascertaining the extent of any runs that might occur, a gillnet was operated in the lower part of the Nanaimo river in July, August and September, 1936. Only three male sockeye were taken. Observations were continued in 1937 and 22 sockeye were caught. All were identified by their scales as five-year fish having spent two years in fresh water. In addition to those that were caught and examined, the fishery guardian saw over thirty sockeye on July 30 and over 100 in August in a pool about five miles above the mouth of the river.

The appearance of five-year sockeye, having spent two years in the lake, in noticeable numbers indicates a close relationship with the planting of the eggs that were collected at Rivers Inlet in 1932.

In relation to the restoration of the sockeye salmon fishery of the Fraser river system a most encouraging return of sockeye to the Anderson-Seton lake system, tributary to the Fraser river, occurred in 1937. This system at one time carried a heavy run of sockeye which practically disappeared some twenty years ago. Between 1920 and 1931 the Department planted considerable numbers of eyed eggs and fry in this system in an effort to restore the run to something like its former proportions but the past two seasons are the first during which real encouragement was observed. In 1936 the run was estimated at 12,000 fish and in 1937 at approximately 70,000. The extraordinary feature of this run is the fact that while the majority of fish were of the four-year type there was an almost negligible run in the brood year of 1933.

In June, Liumchin lake, a barren water in Liumchin Park in British Columbia, was stocked with 10,000 Kamloops trout eyed eggs from the Cultus lake hatchery. This lake is some 4,500 feet above sea level and has an area of approximately twenty-five acres. The eggs were carried by saddle horse up the Liumchin trail. Part of the way was over snow which in sheltered places was ten feet deep.

Boston lake, 4,000 feet above sea level, on the Forbidden Plateau, Vancouver Island, and Long lake in the Upper Comox lake area were stocked with Kamloops trout during the past season.

Water conditions were such in British Columbia in 1937 that many fish in various stages of development became stranded. These were rescued and transferred to suitable locations as shown in the following statement:—

From	To	District	Date	Length	Number	Species
Bark creek.....	Fish lake.....	Okanagan.....	September 2.....	Fry.....	1,500	Kamloops trout.
Bark Shanty creek.....	Deep water of stream.....	Kootenay.....	August 4-12.....	2" to 4".....	1,098	Speckled trout.
Chilliwack river.....	" ".....	Lower Mainland.....	August 27.....	Fry.....	1,200	Coho salmon.
Elk creek.....	" ".....	" ".....	September 17.....	" ".....	350	200 Cutthroat trout and 150 Coho salmon.
Goat river.....	" ".....	Kootenay.....	September 10.....	2½" to 3".....	62	Cutthroat trout.
Little Sheep creek.....	" ".....	" ".....	September 1-13.....	2½" to 3½".....	1,350	Speckled trout.
Lorenzetta river.....	" ".....	Lower Mainland.....	September 22.....	Fry.....	300	Coho salmon.
Meadow creek.....	" ".....	Kootenay.....	October 27.....	3" to 4".....	402	Speckled trout.
Oyama creek.....	Oyama lake.....	Okanagan.....	September 3-18.....	Fry.....	3,000	Kamloops trout.
Pringle creek.....	Monte lake.....	Kamloops.....	September 5-11.....	" ".....	15,800	" "
Six Mile Lakes creek.....	Six Mile Lakes.....	Kootenay.....	September 19.....	2½".....	148	" "
Upper Sumas river.....	Deep water of stream.....	Lower Mainland.....	September 24.....	Fry.....	250	Cutthroat trout.
Vedder river.....	" ".....	" ".....	September 10, 21.....	5".....	30	" "
				Fry.....	600	200 Cutthroat trout —and 400 Coho salmon.
					26,090	

The seeding of Maggie lake, Vancouver island, was resumed in 1937 by the planting therein of 1,500,000 eggs from the Smiths Falls hatchery.

In 1937 this department gave the Provincial Game Board 790,000 Kamloops trout eyed eggs; 400,000 from the Lloyds creek hatchery and 390,000 from the Penask Lake hatchery. Some 580,000 eggs of the same species taken by the Board at Beaver lake were laid down in their eyeing station at Wild creek.

ALBERTA

The arrangement whereby the Banff, Jasper and Waterton Lakes hatcheries were directed by the Department of Fisheries but at the expense of the National Parks Bureau; Lands, Parks and Forests branch, Department of Mines and Resources, was discontinued on April 1, 1937, at which time the Bureau took over the complete management of these hatcheries.

BANFF HATCHERY

J. E. Martin, Superintendent

In February 198,860 salmon trout eyed eggs were received from the Provincial Department of Game and Fisheries, Toronto, Ontario, via their hatchery at Port Arthur. This was an exchange for Kamloops trout eggs from Lloyd's Creek hatchery.

On April 1, there was on hand some 486,000 Loch Leven, 317,300 speckled and 197,540 salmon trout eyed eggs and fry, and brood stock consisting of 646 brown, 1,017 cutthroat, 972 Kamloops, 426 Loch Leven, 2,316 rainbow, 2,888 speckled and 249 salmon trout ranging from one to eighteen years of age.

WATERTON LAKES HATCHERY

G. E. Bailey, Superintendent

On March 1, one hundred thousand six hundred and forty salmon trout eyed eggs (an exchange for Kamloops trout eggs) were received from the Provincial Department of Game and Fisheries, Toronto, Ontario, through their hatchery at Port Arthur. On April 1, one hundred thousand two hundred and forty-six of them were still on hand.

FRASER RIVER WATERSHED

CULTUS LAKE AND SMITHS FALLS HATCHERIES

A. Robertson, Superintendent

The run of steelhead salmon to Sweltzer creek in 1937 was equal to that of the previous year but males were in the majority. Between March 27 and May 17, two hundred and fifty-three thousand ova of this species were collected. Between April 5 and May 15, thirty-nine thousand four hundred cutthroat trout eggs were secured from fish retained in the ornamental pool and tank. Eggs of the same species amounting to 30,914 were purchased from Messrs. E. A. Wells and Son, Sardis. Lloyd's creek eyeing station supplied 199,000 Kamloops trout eyed eggs on June 24 and Smiths Falls hatchery 3,728,000 sockeye eyed eggs in February and March.

Distributions for the calendar year were: Coho salmon 1,063,053, cutthroat trout 65,892, Kamloops trout 198,140, sockeye salmon 3,625,450 and steelhead salmon 203,325; total 5,155,860.

From the trap operated in Sweltzer creek some 2,700 suckers were removed and destroyed. The Biological Board's campaign on the destruction of predatory fishes was continued.

A collection of 1,339,685 cutthroat trout eggs was made from the brood stock held in the wooden ponds at Smiths Falls hatchery.

From the steelhead brood stock 12,107 yearlings were distributed. On August 20 thirty-two cutthroat trout three years were shipped to the Provincial Game Board, Vancouver, for furunculosis research and investigation.

Outgoing shipments during the year were: 3,728,000 sockeye eyed eggs to Cultus lake hatchery in February and March and 1,500,000 for Maggie lake, Vancouver island, in February. Distributions for the season were: Cutthroat trout 897,672, sockeye salmon 12,158,838 and steelhead salmon 12,107; total 13,068,617.

SPORT FISH OPERATIONS—SOUTHERN INTERIOR

NELSON HATCHERY

A. P. Hills and P. B. Stratton, Officers in Charge

The distribution from this hatchery in 1937 was 2,047,731 consisting of 985,829 Kamloops trout, 1,060,560 Kennerly's salmon and 1,342 speckled trout.

At the beginning of the year there were some 1,092,600 Kennerly's salmon eggs and 1,346 speckled trout yearlings in the hatchery.

No collections of Kamloops trout eggs were made during the year in this district, but shipments of eyed eggs of this species amounting to 1,050,000 were received from the Penask Lake hatchery.

At the end of August when all stock was distributed the dismantling of troughs was undertaken, all equipment removed from the Nelson Armoury building and stored.

Fishing generally throughout the district was reported satisfactory and consistently good catches were made in Kootenay lake and river. Porto Rico lake first stocked in 1936 had a good showing of fingerlings when further plantings were made there in 1937. Good results are also apparent from stockings made in Arkansaw and Devil's Hole lakes. The showings of cutthroat trout in Kokanee, Kaslo and Tanal lakes are particularly gratifying.

ARGENTA HATCHERY

E. Hunter, Officer in Charge

Operations at this sub-station commenced on June 12, consisting of the setting up of hatching troughs and water system. As considerable trouble had been experienced in past seasons with silt collecting in the troughs when Argenta creek was high a settling tank six by five by two feet six inches deep was erected to eliminate this difficulty.

In July 400,000 Kamloops trout eyed eggs arrived from Penask Lake hatchery. These were laid down in the troughs and the resultant fry, viz., 363,495, were liberated in the upper end of Kootenay lake.

At the end of the season the equipment was dismantled as in previous years and stored in a building on private property adjacent to the site.

PENASK LAKE AND SUMMERLAND HATCHERIES

R. H. Eaton, Superintendent

Due to high water conditions at Penask lake during the run of Kamloops trout, a number of parent fish escaped around the fences in 1937. However, a satisfactory collection of 3,413,000 eggs was secured; some 141,000 being obtained from Spahomin creek and 3,272,000 from Penask creek. The number of parent fish captured at Spahomin creek was 224 females and 220 males and

at Penask creek 5,457 females and 4,741 males. Transfers of eyed eggs to other establishments were: 400,000 Argenta; 1,050,000 Nelson; 943,100 Summerland; 405,500 Cranbrook, and 390,000 to the Provincial Game Board. Distributions for the season were: 795,500 eyed eggs made up of shipments to the Cranbrook hatchery and to the Provincial Game Board and 91,860 fry; a total of 887,360.

During the year a bridge was constructed across Penask creek.

As no collections of eggs are made at Summerland hatchery, it depends entirely on its supply from an outside source, which this year was Penask Lake hatchery and which supplied it in June and July with 943,100 Kamloops trout eyed eggs. The total distribution for the year was 927,320, consisting of 383,100 eyed eggs and 544,220 fry. Included in the above distributions were allotments of fry, as follows: To the Vernon Fish and Game Association 20,000, to the Princeton Rod and Gun Club 96,000 and to the Penticton Rod and Gun Club 20,000.

LLOYD'S CREEK HATCHERY

A. P. Hills, Superintendent

The run of parent Kamloops trout in 1937 to Paul and Pinantan creeks and Knouff lake was, it is believed, the largest on record. At Knouff lake the collections in the past five years have increased from less than a quarter of a million to over three-quarters of a million. The spawning run at Fish lake was up to the average for the past few years, but the collection there was smaller this year, which at least is partially due to a larger number of fish spawning along the shores of the lake. The following collections were made: Fish lake 872,000, Knouff lake 763,000, Paul creek 1,530,000 and Pinantan creek 1,059,000; total, 4,244,000, which is an increase of 433,000 over last year.

Through an exchange agreement with the Provincial Department of Game and Fisheries, Ontario, 100,000 Kamloops eyed eggs were sent their hatchery at Chatsworth.

Distributions for the season were: 2,717,000 Kamloops eyed eggs and 968,566 fry; total 3,685,566. The above includes allotments of eyed eggs, as follows: to the Revelstoke Rod and Gun Club, Biological Station, Taft, 120,000 and to the Provincial Game Board, Vancouver district, 400,000.

Sport fishing was again reported very good generally throughout the Kamloops and Shuswap districts, excellent catches being made from several lakes which were barren of fish life prior to being stocked by this department, especially Peterhope, McConnel and Andy lakes.

During egg-collecting operations at Paul creek 28 Kamloops trout were caught that had been tagged by the Fisheries Research Board in 1937 as compared with 16 that were taken during the previous year. Of those caught in 1936, two were again taken in 1937. These recaptures would indicate that a good percentage of the Kamloops trout of Paul lake and its tributary streams are biennial spawners.

BEAVER LAKE EYEING STATION

R. A. McRae, Officer in Charge

After obtaining 750,580 Kamloops eggs for this station, the staff assisted the Provincial Game Board in collecting an additional 580,000 for their eyeing station at Wild creek, making a total collection at Beaver lake this year of 1,330,580 ova.

The distributions for the season were: 302,000 eyed eggs and 391,280 fry; a total output of 693,280 Kamloops trout, which included 300,000 eyed eggs and 50,000 fry for the Kelowna Rod and Gun Club.

Good showings of yearlings were observed in Lost, Doreen, Wilma and Echo lakes, which were previously barren of fish life.

STATEMENT BY SPECIES, OF LOCAL COLLECTION AND DISPOSAL OF EGGS DURING 1937

Species	Collection area	Number collected	Disposal—Establishment at	Number	Totals
Atlantic salmon	Margaree pond, N.S.	3,471,000	Margaree	3,471,000	.....
	Nictaux pond, N.S.	360,014	Middleton	360,014	.....
	River Philip, N.S.	5,227,300	Bedford	2,690,400	.....
			Cobequid	2,536,900	.....
	Sackville river, N.S.	728,400	Bedford	728,400	.....
	Miramichi pond, N.B.	7,624,931	Miramichi	7,624,931	.....
	New Mills pond, N.B.	1,743,974	Restigouche	1,743,974	.....
Cutthroat trout	Saint John pond, N.B.	6,104,650	Middleton	498,000	.....
			Yarmouth	1,070,700	.....
			Florenceville	1,012,600	.....
			Grand Falls	2,510,750	.....
			Saint John	1,012,600	.....
	Morell river, P.E.I.	2,475,280	Kelly's pond	2,475,280	27,735,549
	Cultus lake hatchery (mountain pond and tank), B.C.	39,400	Cultus lake	39,400	.....
	Smiths Falls hatchery ponds, B.C.	1,339,685	Smiths Falls	1,339,685	1,379,085
	Beaver creek, B.C.	402,600	Beaver lake	402,600	.....
	Crooked creek, Beaver lake, B.C.	71,980	Beaver lake	71,980	.....
Kamloops trout	Echo creek, Beaver lake, B.C.	276,000	Beaver lake	276,000	.....
	Fish lake, Kamloops, B.C.	872,000	Lloyd's creek	872,000	.....
	Knouff lake, Kamloops, B.C.	763,000	Lloyd's creek	763,000	.....
	Paul lake, Kamloops, B.C.	1,530,000	Lloyd's creek	1,530,000	.....
	Pinantan creek, Kamloops, B.C.	1,059,000	Lloyd's creek	1,059,000	.....
	Penask creek, Nicola Valley, B.C.	3,272,000	Penask lake	3,272,000	.....
	Spahomin creek, Nicola Valley, B.C.	141,000	Penask lake	141,000	8,387,580
	Chamcook lakes, N.B.	73,210	Saint John	69,080	.....
			Atlantic Biological Station, St. Andrews, N.B.	4,130	.....
	Grand lake, N.S.	38,000	Bedford	34,000	.....
Rainbow trout	Grand lake rearing ponds, N.S.	8,500	Grand lake	4,000	.....
			Bedford	7,000	.....
	Antigonish hatchery ponds, N.S.	254,150	Grand lake	1,500	119,710
	Giants lake, Guysborough Co., N.S.	12,650	Antigonish	254,150	.....
			Antigonish	12,650	.....
	Yarmouth hatchery ponds, N.S.	160,000	Yarmouth	160,000	.....
	Saint John hatchery ponds, N.B.	5,000	Saint John	5,000	431,800

Speckled trout.....	Antigonish hatchery ponds, N.S.	3,785,429	Antigonish.....	7,795,176
	(b) 4,009,747			
	Margaree hatchery ponds, N.S.	3,012,470	Margaree.....	3,204,970
	(b) 192,500		Cobequid.....	4,500
	Folly river, Colchester Co., N.S.	4,500		
	Hart lake, Colchester and Cumberland Cos., N.S.	380,550	Cobequid.....	380,550
	McRae lake, Richmond Co., N.S.	77,028	Lindloff.....	77,028
	Sand lake, Amnapolis Co., N.S.	121,600	Middleton.....	121,600
	Yarmouth hatchery ponds, N.S.	31,000	Yarmouth.....	150,000
	(b) 119,000			
	Florenceville hatchery ponds, N.B.	2,042,280	Florenceville.....	2,391,964
	(b) 349,684			
	Saint John hatchery ponds, N.B.	983,435		
	(b) 631,130		Saint John.....	1,614,565
	(c) Fortune river, P.E.I.	58,500	Kelly's pond.....	58,500
	Kelly's pond hatchery pond, P.E.I.	5,000	Kelly's pond.....	5,000
	(c) 5,000			15,803,853
Steelhead salmon.....	Sweltzer creek, Cultus lake, B.C.	253,000	Cultus lake.....	253,000
				253,000
				54,110,577

(b) Eggs from yearling fish.

(c) Sea-run variety.

EYED EGGS PURCHASED IN 1937

Species	Month laid down	Purchased from	Laid down in hatchery	Number received	Total by species
Cutthroat trout.....	May.....	E. A. Wells & Son, Sardis, B.C.....	Cultus lake.....	30,914	30,914
Speckled trout.....	December.....	American Fish Culture Company, Carolina, Rhode Island.....	Middleton.....	1,615,880	
	December.....	"	Yarmouth.....	1,513,500	
	October, November.....	Donald Fraser, Plaster Rock, N.B.....	Grand Falls.....	962,259	
	November, December.....	Ambrons Henry East Royalty, P.E.I.....	Kelly's pond.....	30,000	
	November, December.....	Earl Ings, Mount Herbert, P.E.I.....	Kelly's pond.....	90,000	
	November, December.....	Harold Watts, York, P.E.I.....	Kelly's pond.....	175,000	
				4,386,639	
				4,417,553	

Summary of eggs received: Total eggs collected, 54,110,577; total eggs purchased, 4,417,553; total 58,528,130.

EXCHANGED EYED EGGS RECEIVED 1937

From Department of Game and Fisheries, Toronto, Ontario, in exchange for Kamloops and speckled trout:—
 Salmon trout from Belleville hatchery, laid down at Middleton hatchery..... 300,000
 Salmon trout from Port Arthur hatchery, laid down at Banff hatchery..... 198,860
 Salmon trout from Port Arthur hatchery, laid down at Waterton lakes hatchery..... 100,640

In the interest of economy and convenience in the distribution of fry the following transfers of eyed eggs were made in 1937:

Species	From	To	Number	Date received
Atlantic salmon.....	(a) Cobequid.....	Antigonish.....	1,000,000	April 6
	(a) Middleton.....	Nictaux Falls.....	479,125	March 2
	(a) Yarmouth.....	Nictaux Falls.....	1,000,000	February 28
	(a) Miramichi.....	Bedford.....	500,000	March 11
	(a) Miramichi.....	Lindloff.....	1,000,000	April 8
	(a) Miramichi.....	Middleton.....	500,000	April 1
	(a) Miramichi.....	Nictaux Falls.....	500,000	April 1
	(a) Miramichi.....	Restigouche.....	1,000,000	March 19
	(a) Restigouche.....	Florenceville.....	30,000	April 1
	(a) Restigouche.....	Grand Falls.....	220,000	March 31
	(a) Saint John.....	Florenceville.....	500,000	March 9
	(b) Lloyd's creek.....	Cultus lake.....	199,000	June 24
	(b) Penask lake.....	Argenta.....	400,000	July 11
	(b) Penask lake.....	Nelson.....	1,050,000	July 7 and 10
Kamloops trout.....	(b) Penask lake.....	Summerland.....	943,100	June 20, 30, July 10, 17
	(b) Antigonish.....	Lindloff.....	100,000	May 22
Rainbow trout.....	(a) Smiths Falls.....	Cultus lake.....	3,728,000	February 9, 10, 22, March 22
Sockeye salmon.....	(a) Antigonish.....	Bedford.....	500,000	March 19
	(a) Antigonish.....	Lindloff.....	500,000	April 13
	(a) Antigonish.....	Yarmouth.....	500,000	February 26
	(a) Antigonish.....	Florenceville.....	500,000	April 2
	(a) Antigonish.....	Grand Falls.....	500,000	April 2
	(a) Antigonish.....	Miramichi.....	500,000	March 19
	(a) Antigonish.....	Restigouche.....	500,000	March 19
	(a) Antigonish.....	Saint John.....	500,000	April 1
	(a) Antigonish.....	Kelly's Pond.....	50,000	February 26
	(a) Antigonish.....	Antigonish.....	10,200	February 26
	(a) Florenceville.....	Cobequid.....	1,000,000	March 10
	(a) Grand Falls.....	Cobequid.....	1,000,000	March 10

(a) 1936 fall collection. (b) 1937 collection.

TAGGING AND MARKING OF FISH

The tagging of Atlantic salmon taken for fish cultural purposes which was commenced in 1913 was continued on a somewhat larger-than-average scale in 1937 at the several salmon retaining ponds in the Maritime Provinces. The adipose and one ventral or one pectoral fin was removed from a considerable number of Atlantic and Sebago salmon, ouananiche and speckled trout before they were distributed. The object of the tagging is to add to present information in regard to the movements of the fish, frequency in spawning and the extent to which early fish of any season return to fresh water as early fish or vice versa. The marking or fin clipping was practised for the purpose of gaining further information on the movements, growth and survival of hatchery product. The extent of the tagging and marking, as well as of the recaptures reported during 1937, are given in detail in the following statements and in the report of the District Supervisor of Fish Culture for the Maritime Provinces.

ADULT ATLANTIC SALMON, TAGGED BY AFFIXING TAGS TO THE DORSAL FIN, 1937

—	Number tagged	Type of tag	Period of tagging	Where liberated
<i>Nova Scotia—</i>				
Margaree pond.....	33	Silver.....	Sept. 21-22.....	Margaree Harbour
Nictaux Falls pond.....	124	Celluloid.....	Nov. 15-20.....	Nictaux river
River Philip pond.....	34	Silver.....	Oct. 13.....	River Philip
	10	Celluloid.....	Oct. 13.....	River Philip
Sackville river pond.....	34	Silver.....	Sept. 29.....	Sackville river
	205	Celluloid.....	Nov. 8-19.....	Sackville river
<i>New Brunswick—</i>				
Miramichi pond.....	107	Silver.....	Sept. 13-Nov. 9.....	Miramichi river
	510	Celluloid.....	Sept. 13-Nov. 8.....	Miramichi river
New Mills pond.....	10	Silver.....	July 19-Sept. 17.....	New Mills, Bay Chaleur
	159	Celluloid.....	Sept. 22-Nov. 2.....	New Mills, Bay Chaleur
Saint John pond.....	10	Silver.....	Aug. 16.....	Saint John Harbour
	10	Celluloid.....	Aug. 16.....	Saint John Harbour
<i>Prince Edward Island—</i>				
Morell pond.....	34	Silver.....	Oct. 21.....	Morell river

Margaree hatchery	9,000	Sebago salmon.....	"	July 15, 27, Oct. 20, 21.	Grand lake.	"
	10	"	Three years.....	Dec. 10	"	"
	47	"	Wild.....	Dec. 7	"	"
	737	Ouananiche salmon.....	Two years.....	Dec. 7, 8, 9.	"	"
	20,656	Atlantic salmon.....	Fingerlings.....	Oct. 15	Northeast Margaree river, Big Intervale bridge.	Removal of adipose and right pectoral.
Middleton hatchery	312	Speckled trout.....	Five and six years.....	April 26	Lake O'Law.	"
	5,300	Atlantic salmon.....	Fingerlings.....	Oct. 2	Nictaux river.	Removal of adipose and left ventral
	700	Speckled trout.....	"	Sept. 25	Feed lake.....	"
	400	"	"	Sept. 24	McGill lake.....	"
Nictaux Falls rearing station	400	"	"	Sept. 11	Sand lake.....	"
	9,982	Atlantic salmon.....	"	Oct. 14	Nictaux river.....	"
Yarmouth hatchery	40,000	"	"	Oct. 8, 9, 18.	Clyde river.....	Removal of adipose and right ventral.
	20,000	"	"	Nov. 11.	Mersey river.....	"
	21,000	"	Yearlings.....	Oct. 24, Nov. 16 April 16, 17, 19, 21.	Clyde river.....	"
	16,000	"	"	April 24, May 1.	Mersey river.....	"
	6,000	Speckled trout.....	Fingerlings.....	Oct. 27	Baker Flats Pond.	"
	5,700	"	"	Oct. 22	Gardener brook.....	"
	6,000	"	"	Oct. 13	Grand lake.....	"
	2,500	"	"	Dec. 3	Mallett lake.....	"
	5,000	"	"	Oct. 16	Ninth lake.....	"
	2,500	"	"	Dec. 3	Porter or Mistake lake.....	"
	3,000	"	"	Dec. 1	Simpson lake.....	"
	5,000	"	"	Oct. 15	Sixth lake stream.....	"
	2,000	"	Yearlings.....	June 2	Blystner lake.....	"
	3,300	"	"	May 8, Aug. 11.	Carrying Road lake.....	"
	1,000	"	"	May 27	Grafton lake.....	"
	2,500	"	"	April 20	Ellenwood lake.....	"
	2,000	"	"	June 9	Freeman brook-Medway river	"
	2,500	"	"	June 11	Hunt's brook-Medway river.	"
	2,500	"	"	July 26	Long Tuskett river.....	"
	2,530	"	"	Dec. 1	Harris lake.....	"
	1,800	"	"	June 2	Maligeak lake.....	"
	3,000	"	"	May 7	Moose river.....	"
	2,500	"	"	April 20	Salmon lake (Yarmouth county).	"
	4,000	"	"	April 26	Salmon river (Digby county).	"
	3,000	"	"	Aug. 6	Thunder lake.....	"
	2,500	"	"	May 7	Wentworth lake.....	"

(b) Marked by Bedford staff.

FISH MARKED BY FIN CLIPPING, 1937—*Concluded*

	Number marked	Species	Stage of development	Dates of liberation	Liberated	Nature of mark
<i>New Brunswick—</i> Florenceville hatchery....	(a) 25,789	Atlantic salmon....	Fingerlings.....	Sept. 8, 21....	Nashwaak river.....	Removal of adipose and left pectoral.
	3,000	Speckled trout.....	"	Oct. 15.....	Private pond, Power creek, Mr. Zeno Martin.	"
	100	"	Two years.....	May 20.....	Gallivan brook-Saint John river.	"
	212	"	"	May 21, 22....	Big Guisguet river.....	"
	200	"	"	May 19, 20....	Little Guisguet river.....	"
	250	"	"	May 21.....	River de Chute.....	"
	100	"	Four years.....	May 18.....	Big Guisguet river.....	"
	100	"	"	May 19.....	Little Guisguet river.....	"
	100	"	"	May 18.....	River de Chute.....	"
	18	"	Six years.....	May 22.....	McLeary brook-Lakeville pond.	"
	43	"	Seven years.....	May 22.....	"	"
Grand Falls hatchery.....	(a) 10,000	Atlantic salmon....	Fingerlings.....	Oct.....	Salmon river and Little Salmon river.	Removal of adipose and right pectoral.
	(a) 16,104	"	"	Oct.....	St. John river.....	"
	(a) 10,000	"	"	Oct.....	Tobique river.....	"
Miramichi hatchery.....	6,700	"	"	Aug. 28.....	Northwest Miramichi river...	Removal of adipose and right ventral.
	6,600	"	"	Aug. 23.....	Sevoile river.....	"
	3,400	"	"	Aug. 17.....	Trout brook.....	"
	43	"	Yearlings.....	July 24.....	Vodoure lake.....	"
St. John hatchery.....	15,000	Speckled trout.....	Fingerlings.....	July 26.....	Red Rock lake.....	Removal of right pectoral.
	2,210	"	Two years.....	Nov. 6, 16....	Chamcook lake.....	Removal of adipose and right pectoral.
Prince Edward Island— Kelly's Pond hatchery.....	30,940	"	Fingerlings.....	Aug. 23, 24, 25..	Vessey brook-Winter river....	Removal of adipose and left pectoral.

(a) Restigouche stock.

RECAPTURES, 1937—ATLANTIC SALMON

MARGAREE RIVER, N.S.

Number	Weight (lbs.)	Length (ins.)	Condition	Sex	Date	1. Where liberated 2. Where caught
F6704	16 (z) (u) 21	37 44	Kelt..... Clean.....	F F	Dec. 3, 1934 1937	Margaree Pond, N.S. (a) Margaree Pond, N.S.
F7173	15 26	37 40	Kelt..... Clean.....	F F	Nov. 20, 1935 July 26, 1937	Margaree Pond, N.S. La Pointe, Inverness county, N.S.
F7175	12 21	36 40	Kelt..... Clean.....	F F	Nov. 20, 1935 July 19, 1937	Margaree Pond, N.S. Mabou Mines, Inverness county, N.S.
F7442	15 34½	38 41½	Kelt..... Clean.....	F F	Dec. 3, 1935 July 24, 1937	Margaree Pond, N.S. River of Ponds, St. Barbe dis- trict, Newfoundland.
F7595	6 16	26	Kelt..... Clean.....	M M	Dec. 6, 1935 July 21, 1937	Margaree Pond, N.S. Pleasant bay, Inverness county, N.S.
F7617	14 28	37 37	Kelt..... Clean.....	F F	Dec. 7, 1935 July 24, 1937	Margaree Pond, N.S. La Pointe, Inverness county, N.S.
F7658	7 (z) (u) 23	29 44	Kelt..... Clean.....	M M	Dec. 7, 1935 1937	Margaree Pond, N.S. (a) Margaree Pond, N.S.
F7660	7 19	28 36½	Kelt..... Clean.....	M M	Dec. 7, 1935 July 5, 1937	Margaree Pond, N.S. Aucoin point, Inverness county, N.S.
F7703	9 (z) (u) 20	32 40	Kelt..... Clean.....	M M	Dec. 7, 1935 1937	Margaree Pond, N.S. (a) Margaree Pond, N.S.
F7706	7 16½	29 35	Kelt..... Clean.....	M M	Dec. 7, 1935 July 3, 1937	Margaree Pond, N.S. Friar Head, Inverness county, N.S.
F7713	14 30	39	Kelt..... Clean.....	M M	Dec. 7, 1935 July 5, 1937	Margaree Pond, N.S. At Plaster Rock, Broad Cove Chapel, Inverness county, N.S.
F7763	11 28	32 40½	Kelt..... Clean.....	M M	Dec. 7, 1935 July 19, 1937	Margaree Pond, N.S. One-half mile northeast of Mar- garee Harbour, N.S.
F7807	15	36 36	Kelt..... Kelt.....	F F	Nov. 25, 1936 June 15, 1937	Margaree Pond, N.S. La Pointe, Inverness county, N.S.
F7810	18	39	Kelt..... Kelt.....	F F	Nov. 25, 1936 June 7, 1937	Margaree Pond, N.S. La Pointe, Inverness county, N.S.
F7845	14	36	Kelt..... Kelt.....	F F	Nov. 25, 1936 June 3, 1937	Margaree Pond, N.S. Flat Brook, Terre Noire, Inver- ness county, N.S.
F7856	20	41	Kelt..... Kelt.....	F F	Dec. 1, 1936 June 10, 1937	Margaree Pond, N.S. La Pointe, Inverness county, N.S.
F7899	18	37	Kelt..... Kelt.....	F F	Dec. 1, 1936 June 7, 1937	Margaree Pond, N.S. La Pointe, Inverness county, N.S.
F7900	15	36	Kelt..... Kelt.....	F F	Dec. 1, 1936 May 6, 1937	Margaree Pond, N.S. Long Marsh pool, Margaree river, N.S.

(a) Caught for second time for fish cultural purposes, Sept. 21-Oct. 27, 1937.

(u) Liberated with same tag attached.

(z) Weight after stripped.

DEPARTMENT OF FISHERIES

RECAPTURES, 1937—ATLANTIC SALMON—*Concluded*

MARGAREE RIVER, N.S.

Number	Weight (lbs.)	Length (ins.)	Condition	Sex	Date	1. Where liberated 2. Where caught
F7901	8	31	Kelt.....	F	Dec. 1, 1936	Margaree Pond, N.S. Long Marsh pool, Margaree river, N.S.
			Kelt.....	F	May 6, 1937	
F7934	15	37	Kelt.....	F	Dec. 5, 1936	Margaree Pond, N.S. Cape Rouge, Inverness county, N.S.
			Kelt.....	F	June 9, 1937	
F7956	10	33	Kelt.....	M	Dec. 6, 1935	Margaree Pond, N.S. Eight miles from Grand Bay, south, Port-aux-Basques, New- foundland.
			Clean.....	M	May 1937	

NICTAUX RIVER, N.S.

F5386	5 7	27½	Kelt.....	F	Nov. 5, 1936	Nictaux Pond, N.S. Bluff Head, Yarmouth county, N.S.
			Clean.....	F	June 15, 1937	
F5630	9 (w)	32	Kelt.....	F	Nov. 3, 1933	Nictaux Pond, N.S. Hermitage bay, Newfoundland.
			Clean.....	F	July 1, 1936	

RIVER PHILIP, N.S.

F2563	23	39	Kelt.....	F	Nov. 10, 1936	River Philip pond, N.S. River Philip, at Oxford, N.S.
			Kelt.....	F	April 28, 1937	

SACKVILLE RIVER, N.S.

F5805	9½ (v) 12	33	Kelt.....	F	Nov. 13, 1933	Sackville Pond, N.S. Petit De Grat Harbour, Rich- mond county, N.S.
			Clean.....	F	May 20, 1937	
F7035	8 (z) (u) 8½	30 34	Kelt.....	F	Nov. 3, 1936	(b) Sackville Pond, N.S. Sackville Pond, N.S.
			Clean.....	F	1937	
F7039	8 (z) (u) 9	31 33½	Kelt.....	F	Nov. 3, 1936	(b) Sackville Pond, N.S. Sackville Pond, N.S.
			Clean.....	F	1937	
F7052	3½ (z) (u) 3½	22 22½	Kelt.....	F	Nov. 3, 1936	(b) Sackville Pond, N.S. Sackville Pond, N.S.
			Clean.....	F	1937	
F7065	10 (z) (u) 11	31 33½	Kelt.....	F	Nov. 3, 1936	(b) Sackville Pond, N.S. Sackville Pond, N.S.
			Clean.....	F	1937	
F7088	8½ 13	31 33	Kelt.....	F	Nov. 5, 1936	Sackville Pond, N.S. Bedford Basin, N.S.
			Clean.....	F	July 20, 1937	
F7100	5½ (v) 10	26½	Kelt.....	F	Nov. 5, 1936	Sackville Pond, N.S. Terre Noire, Inverness county, N.S.
			Clean.....	F	July 1937	

MIRAMICHI RIVER, N.B.

(c) 621	17	38	Kelt.....	F	Nov. 2, 1937	Miramichi Pond, N.B. Miramichi river, Chatham, N.B.
			Kelt.....	F	Dec. 8, 1937	
(c) 763	11	31½	Kelt.....	M	Nov. 8, 1937	Miramichi Pond, N.B. Miramichi river, Nordin, N.B.
			Kelt.....	M	Dec. 2, 1937	
(c) 839	10½	31	Kelt.....	M	Nov. 6, 1937	Miramichi Pond, N.B. Miramichi river, Oak Point, N.B.
			Kelt.....	M	Dec. 3, 1937	

(b) Caught for second time for fish cultural purposes, Sept. 26-Oct. 29, 1937.

(c) Celluloid tags.

(u) Liberated with same tag attached.

(v) Weight estimated.

(w) Reported in 1937.

(z) Weight after stripped.

NOVA SCOTIA
ANTIGONISH HATCHERY

	Atlantic salmon			Rainbow trout			Speckled trout						
	Advanced fry	Fingerlings		No. 1	Fingerlings		Two years	Advanced fry	Fingerlings		Year-lings	Two years	Old fish
		No. 1	No. 4		No. 1	No. 3			No. 1	No. 4			
Antigonish Co.—													
Beaver Meadow river...								35,000	10,000				
Brierly brook...									30,000		400		
Copper lake...								45,000					
Glenroy river...													
Grant lake...												200	
James river...	40,000							5,000			1,000		
MacMillan lake...											250		
Maryvale brook...									10,000				
Meadow Green river...								45,000	15,000				
North lake...									25,000				
Polson brook-South river...													
Rights river...	40,000												
South lake...								15,000					
South river...	40,000							33,707	16,293		1,441	179	
West river...								30,000		5,000	181	400	235
Guysborough Co.—													
Cole Harbour lake...								15,000					
Coose Coffre lake...													
Cooper lake...													
Country Harbour river...	90,000	30,000						15,000			727	273	
Cutler lake...													
Dobson lake...													
Donahue lake...											500		
Ecum Secum river...								35,000			340	128	
Giant lake...								30,000			500	1,000	
Guysborough river...							185						
Harrigan lake...	40,000								25,000		2,000		
Hazel Hill lake...													
Indian Harbour lake...								20,000					
Jellow lake...								20,000					
Long lake—East River St. Mary...									40,000				
McKeen lake...										2,000	404		
Robertson lake...										2,000	200		

ANTIGONISH HATCHERY—*Concluded*

	Atlantic salmon			Rainbow trout			Speckled trout			
	Advanced fry	Fingerlings		No. 1	Fingerlings		Advanced fry	Fingerlings		Two years
		No. 1	No. 4		No. 1	No. 3		No. 1	No. 4	
Salmon river.....	75,000						30,000			
East River St. Mary.....	80,000	120,000	20,462							
West River St. Mary.....	150,000						25,000		500	1,200
Sherbrook lake.....				20,000	17,512		15,000			
Smelt lake.....										
Three Mile lake.....										
Tracadie river.....	50,000								200	
Trout lake.....										
Pictou Co.—										
Barney river.....	50,000						35,000			
Big brook—East river.....							40,000			
Brora lake.....							40,000			900
Campbell lake-River John.....							30,000			
Campbell lake-French river.....		50,000								
East river.....										50
Fraser's pond-Little Harbour.....	30,000						15,000			
French river.....										
French river, branch.....							20,000			
McLellan brook.....							45,000			
McPherson lake.....							15,000			
Maple lake.....										
Middle river.....	10,000									
Moose river.....		10,000						45,000		690
Robertson lake.....										
Simon lake.....							15,000			
Six Mile brook.....										
Stewart dam tributary to Little Harbour.....							25,000		500	1,125
West branch brook.....							75,000			
West river.....										
	485,000	410,000	30,462	20,000	17,512	185	588,707	396,293	11,000	6,145
										235

1,973,182

Total distribution.....

BEDFORD HATCHERY

	Atlantic salmon				Speckled trout		
	Eyed eggs	Advanced fry	Fingerlings		Advanced fry	Fingerlings	
			No. 1	No. 2		No. 1	No. 2
Dalhousie University, Halifax.....	3,000						
Colchester Co.—							
D'Armand lake.....							
Otter brook.....					30,000		
Stewiacke river.....		60,000			30,000		
Stewiacke river, south branch.....					30,000		
Halifax Co.—							
Bennett lake.....							
Chezzetcook river.....		60,000				1,200	
Conrod lake.....							
Fish lake.....						30,000	
Five Island lake.....						30,000	
Fraser lake-Nine Mile river.....						30,000	
Gay river.....			60,000			30,000	
Governor lake-Nine Mile river.....						30,000	
Halfway river.....						30,000	
Higgins lake.....					60,000		
Ingram river.....			90,000				
Junction lake.....							
Kehoe or Second lake.....						30,000	
Little Quoddy lake.....						30,000	
Little Sandy lake-Sackville river.....						30,000	
McLeod lake.....						30,000	
Musquodoboit river.....						12,860	
Newcombe lake.....		32,000	60,000				
Nine Mile river.....		30,000			20,000	10,000	
Ossier river.....		30,000					
Oyster ponds.....							
Upper Petpeswick, Long Bridge or Bridge End lake.....						30,000	
Portuguese Cove lake.....						30,000	
Queensland pond.....						18,420	
Rocky brook-Moser river.....						30,000	
Round or Little lake-Porter lake.....						30,000	
Round pond.....					60,000		
Sackville river.....					30,000		
Salmon river (Port Dufferin).....		60,000	25,000	19,480			
Second Sheldrake lake.....			60,000				
Smith brook-Necumteuch Harbour.....						30,000	
Taylor brook.....						30,000	
West River Sheet Harbour.....			30,000				
Hants Co.—			90,000				
Cameron lake.....							
Cayley or Kaley lake.....						30,000	
Kennetcook river.....		60,000			30,000		
Lily lake-St. Croix river.....							
Norman lake.....						30,000	
Pentz lake.....						30,000	
Pigot lake.....						30,000	
Uniacke lake.....						30,000	
Lunenburg Co.—						30,000	
Awalt lake.....							
Corkum lake.....					30,000		
Cranberry lake.....						30,000	
Gold river.....			90,000		30,000		
Hennigar lake.....							
Long lake-St. Margaret's bay.....						30,000	
Mill lake-Hubbard river.....					30,000		
Mill lake-Middle river.....							42,855
Middle river.....						30,000	
Pigeon lake.....			90,000				
Spectacle lake.....						60,000	
Spondon lake.....						30,000	
					50,000	30,000	
	3,000	332,000	595,000	19,480	410,000	912,480	42,855

Total distribution..... 2,314,815

DEPARTMENT OF FISHERIES

COBEQUID HATCHERY

	Atlantic salmon		Speckled trout fingerlings		
	Advanced fry	Fingerlings No. 1	No. 1	No. 2	No. 3
Northumberland Co., N.B.—					1,000
Lac St. Emile.....					
Colchester Co.—					
Debert river.....	50,000	30,000			
Economy river.....		100,000		15,000	
Economy lake.....					
Folly river.....	50,000	30,000		30,000	8,000
Folly lake.....			10,000	10,058	
French river.....				10,000	
Gamble lake.....	50,000	30,000			
Great Village river.....			15,000		
Hart lake.....			8,000		
Indian lake.....			15,000		
Irving lake.....				15,000	
Long lake-French river.....				15,000	
McCallum lake.....				15,000	
Newton lake.....	50,000	50,000			
North river, near Truro.....		83,000			
Portapique river.....	50,000	40,000		15,000	
Salmon river.....			30,000		10,000
Shatter lake.....			15,000		
Simpson lake.....			15,000		
West Branch lake—River Philip.....			15,000		
Whirley Wha lake.....					
Cumberland Co.—			10,000		
Amherst Pumping Station pond.....				10,000	
Atkinson pond-Polly brook.....			10,000		
Black river.....				15,000	
Blair lake.....					2,000
Colwell brook.....			3,000		
Coulter lakes.....			20,000		
Cranberry lake.....				17,000	
Currie pond.....			15,000		
Dead lake.....			30,000		
Fountain lake.....				15,000	
Fox river.....				20,000	2,500
Gilbert lake.....					2,500
Halfway river lake.....			10,000		5,000
Marrison lake.....			12,000	10,000	
Isaac lake.....			8,000		
Leak lake.....			6,000		
Little lake-Newfound lake.....				20,000	
McAloney lake.....			10,000		
McLeod lake.....	50,000	30,000	10,000		5,000
Maccan river.....			10,000		5,000
Maccan river, south branch.....					
Maccan river, west branch.....			10,000		
Mountain brook.....			12,000	10,000	
Newfound lake.....				15,000	2,500
Parrsboro Aboiteau.....			10,000		
Poison lake.....				15,000	
Ramshead river.....				10,000	
Ramshead lake.....	125,000	271,200		20,000	7,622
River Philip.....			12,845		
River Philip, west branch.....				20,000	
River Philip, east branch.....	50,000	30,000			
Shinimikas river.....			15,000		
Silica lake of Bass River lake.....			8,000		
Sugarloaf brook.....				20,000	
Sutherland lake.....			8,000		
Tillie creek.....	120,000	30,000	8,000	20,000	8,000
Wallace river.....				20,000	
Wallace river, west branch.....			6,000		
Webb lake.....				20,000	
Welton lake.....					
Pictou Co.—		100,000			
River John.....					
	595,000	824,200	351,845	402,058	59,122

Total distribution..... 2,232,225

GRAND LAKE REARING PONDS

	Atlantic salmon fingerlings				Year- lings	Oua- nache Two years	Sebago salmon	
	No. 1	No. 2	No. 4	No. 5			Year- lings	Three years
Colchester Co.—								
Pembroke river.....	40,000							
Halifax Co.—								
Big Salmon river.....	40,000		9,000	4,000	4,000			
Charles or Third lake.....			6,060		8,800		700	
Grand lake.....					2,197	737	9,000	10
Nine Mile river.....					3,000			
Sackville river.....				4,000	3,000			
Salmon river (Port Duf- ferin).....	40,000							
Ship Harbour lake.....	40,000		7,200		3,000			
Springfield lake.....			10,000					
Hants Co.—								
McLeod brook-Kennet- cook river.....	40,000							
Lunenburg Co.—								
Gold river.....	40,000	25,500						
Middle river.....	40,000		5,400		4,000			
	280,000	25,500	37,660	8,000	27,997	737	9,700	10
Total distribution.....							359,604	

KEJIMKUJIK REARING PONDS

	Atlantic salmon Fingerlings		Speckled trout Fingerlings		
	No. 1	No. 2	No. 1	No. 2	No. 3
Annapolis Co.—					
Little river.....				44,175	7,757
Maitland river.....				24,500	
Mount Tom brook.....				29,000	
West river.....				41,000	
Queens Co.—					
Cashman brook.....				10,000	
Fairy lake.....				15,000	2,000
Grafton lake.....			3,000	13,600	1,100
Grafton brook.....				5,000	
High lake.....				10,000	
Kejimkujik lake.....				125,000	9,000
McGinty brook.....				10,000	
Medway river.....		4,335			
Mersey river.....	21,500				
Roger brook.....				20,000	
	21,500	4,335	3,000	347,275	19,857
Total distribution.....				395,967	

LINDLOFF SUB-HATCHERY

	Atlantic salmon Fingerlings		Rainbow trout Finger- lings
	No. 1	No. 2	No. 2
Cape Breton Co.—			
Enon lake (via Munroe lake).....			38,850
Caspereau river.....	40,000	36,930	
Lever lake.....			38,848
Salmon river.....	190,000	181,395	
Richmond Co.—			
Grand river.....	155,000	207,509	
McKay or Murchison brook-Grand river.....	50,000		
	435,000	425,834	77,698
Total distribution.....			938,532

MARGAREE HATCHERY

	Atlantic salmon				Speckled trout					Old fish	
	Advanced fry	Fingerlings				Fingerlings					
		No. 1	No. 2	No. 3	No. 4	No. 1	No. 2	No. 3	No. 4		No. 5
Dr. A. G. Huntsman, Fisheries Research											
Board of Canada...											
Cape Breton Co.—											
Bell lake...											
Brown lake...											
Canoë lake...											6,000
Chain lakes—Mira river...											8,000
English lake...											
Forester lake...											8,000
Giovanetti lake...											
Grand lake—Indian bay...											15,000
Hardy lake...											15,000
Kelvin or McDonald lake...											6,000
Jackson lake...											
McCormack lake...											6,000
McIntyre lake...											
Scott lake...											15,000
Dalem lake (Boularderie island).											
Inverness Co.—											3,000
Captain John's brook...											
Cheticamp river...											
Flat brook...											5,000
Gallant river...											
Gillis brook...											
Glen brook—River Denys...											
Little Judique river...											
Northeast Mabou river...											
Southwest Mabou river...											
Northeast Margaree river—											
Between Big Intervale, Ward's pool	100,000										
and Old Bridge...											
Between Ingraham bridge and White-											
ley pool...	100,000										
Big brook...											
Big Intervale bridge...	200,000	60,000	40,000	70,000	42,000						5,000
Black Rock pool...			50,000	30,000							
Cranton bridge...	100,000		30,000								
Crowdis pool...				18,000							
Doyle's bridge...		60,000									

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MIDDLETON HATCHERY

	Atlantic salmon						Salmon trout			Speckled trout		
	Fry	Advanced fry	Fingerlings				Fry	Advanced fry	Finger- lings No. 1	Advanced fry	No. 1	No. 2
			No. 1	No. 2	No. 3	No. 4						No. 3
Annapolis Co.—												
Allen lake, west.		45,000	40,000	40,000								8,000
Annapolis river.												1,000
Bowly brook.												
Cranberry lake.												8,000
Crisp brook.												10,000
Parker brook.												10,000
Crotched lake.												10,000
Durling lake..												15,000
Elliott lake.											10,000	16,000
Fales river.				25,000								15,000
Fed lake.....												12,000
Foster lake.												
Gibson lake.										10,000		
Lake LaRose.										15,000		
Lamb brook..											10,000	
Iequille river.			50,000	50,000								
Lily lake.....												15,000
Little river—Annapolis river.												1,500
Long lake-Medway river....				40,000								10,000
Long lake-North Mountain.												10,000
McGill lake.											10,000	1,000
McLennan lake.											15,000	
Milford lake.											40,000	
Morton brook.												
Nictaux river.										10,000		
Paradise lake.				60,000	180,000	97,300				350,000		
Private lake....										20,000		
Round Hill river.											5,000	
Rumsey lake.				100,000								10,000
Sand lake.											4,000	
Sandy Bottom lake..												15,000
Shannon lake.												1,500
Shannon river.												
Slocumb brook.												
Stonach lake....											20,000	
Thirty lake....										6,000		
Trout lake.												
Waterloo lake.....										30,000	8,000	
Wright lake.												12,000
Zwicker lake.								15,000			20,000	

DEPARTMENT OF FISHERIES

MIDDLETON HATCHERY—Concluded

—	Atlantic salmon				Salmon trout		Speckled trout																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	Fry	Advanced fry	Fingerlings				Fry	Advanced fry	Fingerlings																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
			No. 1	No. 2	No. 3	No. 4			No. 1	No. 2	No. 3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
Digby Co.— Feed lake..... Lake Jolly..... Hants Co.— Avon river, south branch..... Avon river, west branch..... Lebreau brook..... Murphy lake..... Panuke lake..... Zwicker lake..... Kings Co.— Aylesford lake..... Cornwallis river..... Gaspereau lake..... Gaspereau river..... Habitant river..... Halfway river..... Hardwood lake..... Lake Paul..... Lake Torment..... Murphy lake..... Nimchin Page lake..... Sutton's pond..... Trout river..... Upper Sixty lake..... Lunenburg Co.— Canoe lake, north..... Canoe lake, south..... Card lake..... Butler lake..... Franeys lake..... Gold river..... La Have river..... La Have river, north branch..... Lake William..... Middle river..... Ninevah lake..... Pettie river.....			25,000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		

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Total distribution.....	3,231,175
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NICTAUX FALLS REARING STATION

	Atlantic Salmon Fingerlings			
	No. 2	No. 3	No. 4	
Annapolis Co.,— Nietaux river.....	100,000	25,000		210,100
Total distribution.....				335,100

Total distribution.....	335,100
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No.	—	Atlantic salmon					Kam- loops trout Six years	Rainbow trout		
		Fry	Fingerlings					Year- lings	Fingerlings	
			No. 2	No. 3	No. 4	No. 5			No. 4	No. 5
	Annapolis Co.—									
1	Simpson lake.....									
2	Digby Co.—									
3	Babine Meadows.....									
4	Belliveau Cove river.....									
5	Carrying Road lake.....							13,000		
6	Clear lake.....									
7	Clearwater lake.....									
8	Dean brook.....									
9	Doucette brook.....									
10	Grund lake.....									
11	Grosses Coques river.....									
12	Harris lake.....									
13	Long Tuskett lake.....									
14	Mallett lake.....									
15	Meadow brook-Carleton river.....									
16	Meteghan river.....									
17	Moose river.....									
18	Ninth lake.....									
19	Porter or Mistake lake.....									
20	Salmon river.....	100,000	10,000		50,000	16,000	27,000			
21	Seven Pence Ha' Penny river.....									
22	Silver river.....									
23	Sissiboo river.....									
24	Sixth lake stream.....									
25	Thunder lake.....									
26	Wentworth lake.....									
27	Kings Co.—									
28	Sunken lake.....							8,000	10,000	
29	Lunenburg Co.—									
30	Blystner lake.....									
31	Feener's lake.....			200						
32	Maligeak lake.....									
33	Wiles lake.....							10,000	10,000	
34	Queens Co.—									
35	Deep lake.....									
36	Freeman brook-Medway river.....									
37	Grafton lake.....									
38	Hunt's brook-Medway river.....									
39	Medway river.....				16,000					
40	Mersey river.....				20,000	39,000				
41	Tupper lake.....							16,000		
42	Shelburne Co.—									
43	Baker's Flats pond.....									
44	Barclay brook-Jordan bay.....									
45	Big brook.....									
46	Birchtown brook.....									
47	Bloody creek.....									
48	Branch brook-Clyde river.....									
49	Branch brook-Roseway river.....									
50	Clyde river.....				40,000	29,000				
51	Deception brook.....									
52	Ogden brook.....									
53	Roseway river.....		60,000							
54	Tirney brook.....									
55	Yarmouth Co.—									
56	Argyle river.....									
57	Brazil lake.....							10,000		
58	Burrell brook.....									
59	Carleton river.....									
60	Coldstream river.....									
61	East branch-Tuskett river.....									
62	Ellenwood lake.....									
63	Gardner brook.....									
64	Jesse lake.....									
65	Big Meadow brook.....									
66	Little Meadow brook.....									
67	Pleasant lake.....									
68	Reuben's brook-Tuskett river.....									
69	Salmon river.....	100,000			25,300					
70	Salmon lake.....									
71	Salmon lake brook.....									
72	Tuskett river.....							20		
73	Utley lake.....									
		200,000	70,000	200	151,300	16,000	95,000	20	57,000	20,000

Total distribution.....

HATCHERY

Rainbow trout				Speckled trout								No.
Year- lings	Three years	Four years	Five years	Fry	Ad- vanced fry	Fingerlings				Year- lings	Two years	
						No. 1	No. 3	No. 4	No. 5			
									3,000			1
				40,000								2
				30,000								3
10,000										3,300		4
						30,000						5
				30,000		15,000						6
						15,000						7
				30,000				6,000				8
												9
										530		10
										2,500		11
							10,000		2,500			12
				140,000								13
												14
								5,000		3,000		15
									2,500			16
										4,000		17
							5,000					18
							10,000					19
							20,000					20
								5,000				21
										3,000		22
										2,500		23
8,000												24
												25
												26
								100		2,000		27
										50	18	28
9,020		10								1,500		29
												30
4,000												31
										2,000		32
										1,000		33
										2,000		34
												35
16,500												36
												37
									6,000			38
						15,000						39
						20,000						40
							10,000					41
						15,000						42
						10,000						43
							5,000					44
								15,000				45
						15,000						46
						45,000						47
						15,000						48
												49
					50,000							50
	100		87									51
				120,000			5,000					52
				100,000			20,000					53
				60,000				10,000				54
										2,500		55
				215,000				5,700				56
				45,000								57
				40,000								58
				40,000								59
				20,000								60
												61
												62
										2,500		63
							5,000					64
							20,000					65
												66
												67
47,520	100	10	87	910,000	50,000	195,000	135,000	21,800	14,000	32,380	18	

2,015,435

NEW BRUNSWICK
FLORENCEVILLE HATCHERY

	Atlantic Salmon			Speckled Trout							
	Fingerlings			Green eggs	Fingerlings			Two years	Four years	Six years	Seven years
	No. 1	No. 2	No. 3		No. 1	No. 3	No. 4				
Atlantic Biological station, Saint Andrews, N.B.....				700							
New Brunswick Fish and Game Protective Association, Fredericton branch Carleton Co.—		500			250						
Acker creek-Saint John river.....	130,000	76,000		20,000							
Becaguinec river.....				80,000			212	100			
Big Guisquit river.....				60,000			200	100			
Little Guisquit river.....	75,000		36,000								
Big Presquile river.....			40,000								
Little Presquile river.....			7,736								
Big Shiktahawk river.....	40,000										
Little Shiktahawk river.....	30,000										
Birmingham brook-Becaguinec river.....				5,000							
Bogan brook-Southwest Miramichi river.....	10,000										
Bubby brook-Saint John river.....				6,000							
Bull creek-Saint John river.....				70,000							
Burndland brook-Becaguinec river.....				5,000							
Burpee brook-Presquile river.....				10,000							
Clearwater brook-Southwest Miramichi river.....	15,000										
Colton brook-Shiktahawk river.....				10,000							
Day brook-Becaguinec river.....				5,000							
Dingee brook-Saint John river.....				3,000							
Gallivan brook-Saint John river.....				15,000			100				
Gin brook-Becaguinec river.....				5,000							
Hagerman brook-Saint John river.....				25,000							
Hardwood brook-Saint John river.....				12,000							
Second Howard brook-Becaguinec river.....				5,000							
Lanes creek-Saint John river.....				10,000							
McLeary brook-Lakeville pond.....				30,000						18	43
McQuade pond-Saint John river.....				40,407							
Mallory brook-Saint John river.....				15,000							
McDuxnekeag river.....	120,000	80,000	18,000								
Mile brook-Saint John river.....				2,000							
Southwest Miramichi river, north branch.....	195,000		38,000								
Southwest Miramichi river, south branch.....	125,000	72,000	38,000								

DEPARTMENT OF FISHERIES

GRAND FALLS HATCHERY

	Atlantic salmon Fingerlings			Speckled trout	
	No. 1	No. 2	No. 3	Fry	Finger- lings No. 1
Salmon river—Victoria Co.—					
Salmon river, headwaters.....		35,000	210,277		
Salmon river, mouth of.....	40,000				
Salmon river, at Estey camp.....		20,000			
Salmon river, at Guimont lodge.....		40,000			
Salmon river, at Power's camp.....		40,000			
Aubin crossing.....		30,000			
Big bogan.....		10,000			
Boat Landing.....	30,000	20,000			
Cote Mill.....	30,000	70,000			
Covered bridge.....		30,000			
Cyr flats.....		20,000			
Danish Mill.....		30,000			
Davis Mill.....	25,000	10,000			
Little Salmon river.....	45,000	40,000			
Mooney brook.....				85,000	
Sutherland brook.....				60,347	85,000
St. John river—Victoria Co.—					
Andover.....		75,000			
Andover bar.....		55,000			
Andover, lower.....		35,000			
Argosy.....		5,072			
Aroostook bar.....	45,000	35,000			
Aroostook junction.....		35,000			
Aroostook river, mouth of.....		20,000			
Boutout brook.....					10,000
Cliffordvale.....		10,000			
Coronation.....	25,000	10,000			
Four Falls brook.....					35,000
Gallagher flats.....		35,000			
Hart brook.....					10,000
Hatchery brook, below falls.....					10,000
Hitchcock flats.....		35,000			
Inman flats.....		60,000	25,000		
Kilburn ferry.....		135,000	25,000		
Limestone.....	25,000	20,000			
Morrill.....	25,000				
Muniac river, mouth of.....		95,000	20,000		
Ortonville.....	25,000				
Perth.....		20,000			
Perth junction.....		55,000			
Perth, lower.....		75,000	40,000		
Perth, upper.....		20,000			
Sullivan flats.....		10,000			
Fraser's dead water, Three brooks.....				21,949	
Three brooks, below dam.....				50,000	
Undine.....		10,000			
Watson flats.....		10,000			
Tobique river, mouth of.....		35,000	10,000		
Arthurette bridge.....		20,000			
Millers.....			40,000		
Millers bogan.....		40,000	20,000		
Red Rapids.....		20,000			
Riley brook.....			20,000		
Two brooks.....		40,000			
Waters bogan.....		20,000	20,000		
Madawaska Co.—					
Grand river.....				100,000	
Bear brook.....				100,000	
Burgess Mill.....				50,000	
Iroquois river.....					200,966
Little river—					
Beaulieu's Mill.....					75,000
Coombe brook.....					50,000
Dead brook.....					100,000
Michaud rocks.....					50,000
Six mile brook.....					50,000
Siegas river.....				100,000	
Trout brook.....					100,000
	315,000	1,430,072	430,277	567,296	775,966

Total distribution..... 3,518,611

MIRAMICHI HATCHERY

	Atlantic salmon			Speckled trout			Year- lings
	Advanced fry	Fingerlings		Advanced fry	Fingerlings		
		No. 1	No. 2		No. 1	No. 2	
Aboujgan river.....					11,000		
Black river-Northumberland Co.....					12,500	2,300	
Buckley lake.....				16,000			
Buctouche river, south branch.....				12,000			
Caraquet river.....				8,000			
Cocagne river.....				12,000			
Elmtree river.....				8,000		2,000	
Grand Aldouane river.....				12,000			
Green brook-Bartibog river.....					12,000		
Hashmans brook-Westmorland Co.....					27,500		
Branch.....					6,000		
Hayward brook-Albert Co.....					5,000		
Kennebecasis river.....						400	
Kouchibouguac river.....						800	
Branch.....					6,000	2,000	
McGinnis brook.....					5,000		
Little river-Nipisiguit bay.....				8,000			
Little river-Westmorland Co.....				12,000		6,000	
Little Southwest Miramichi river.....	438,000	248,800				1,600	
McKee Mills river.....							
Middle river.....			56,000	8,000			
Mill creek stream-Albert Co.....					12,000		
Millstream-Nipisiguit bay.....				12,000			
Nappan river.....				8,000			
Nigadu river.....				12,000			
North river-Westmorland Co.....				4,000			
Northwest Miramichi river.....	945,000	32,000	18,000		5,000		
Buckley pond.....							
Millstream.....	56,000	32,000	27,516				
Sevozie river.....			184,000				
Stewart brook.....		21,600					7
Trout brook.....			27,200				
Pabineau river.....					12,500		
Pokemouche river.....				12,000			
Pollett river-Albert Co.....						800	
Richibucto river, Coal branch.....				4,000		2,000	
St. Nicholas river.....				8,000			
Salmon river.....				8,000		2,000	
Scoudouc river.....					16,000	800	
Southwest Miramichi river.....		171,200	33,000				
Barnaby river.....	112,000						
Burntland brook lake.....					12,500		
Cain river.....	48,000	256,000					
Renous river.....		166,400					
Dungarvon river.....	56,000	43,200	18,000				
Taxis river.....	94,500						
Tabusintac river.....		76,800	60,200				
Eskedelloe brook.....				8,000			
Tetagouche river.....			57,600				
Tracadie river.....				12,000			
Little Tracadie river.....				12,000			
Turtle creek-Albert Co.....				8,000		800	
West river-Albert Co.....						800	
Wrigley lake.....				8,000			
Votoure lake.....					9,000		43
	1,749,500	1,048,000	481,516	212,000	152,000	22,300	50

Total distribution..... 3,665,366

RESTIGOUCHE HATCHERY

	Atlantic salmon			Speckled trout	
	Advanced fry	Fingerlings		Fry	Advanced fry
		No. 1	No. 2		
Charlo river, north branch.....				20,386	38,414
Charlo river, south branch.....					30,000
Christopher brook.....				25,000	
Black brook.....				15,000	
Lamontagne lake.....				10,000	
Eel river.....				60,000	
Grog brook.....				50,000	
Jacquet river.....		90,000			
Island lake.....					25,000
Loch Lomond.....				4,000	
Louison river.....					71,792
Jack Burns lake.....					23,208
Middle river.....	50,000				
Nipisiguit river.....	360,000				
Restigouche river.....	93,299	488,858	38,082		
Kedgwick river.....		115,000			
Little Main river.....		150,000			
Matapedia river.....	75,000	479,349			
Patapedia river.....		50,000			
Upsalquitch river.....	75,000	359,154			
Walker brook.....				25,000	10,295
	653,299	1,732,361	38,082	209,386	198,709

Total distribution..... 2,831,837

ST. JOHN HATCHERY

	Atlantic salmon			Sebago salmon Two years	Rainbow trout Old fish	Speckled trout					
	Advanced fry	Fingerlings				Fry	Advanced fry	Fingerlings			
		No. 1	No. 2					No. 3	No. 4		
Atlantic Biological Station, Saint Andrews, New Brunswick.....						10,000					
Albert Co.—											
Fenton pond—Crooked creek.....								2,500			
Little river.....								2,500			
Point Wolfe river.....								10,000			
Pollett river.....								10,000			
Stamard lake.....								10,000			
Turtle creek-Petitcodiac river.....								10,000			
West river.....								10,000			
Charlotte Co.—											
Bartlett brook.....								15,000			
Bonaparte lake.....								15,000			
Burns brook-Digdegush river.....								10,000			
Chamcook lakes.....					2,210						
Clarence stream—Magaguadavic river.....								30,000			
Crab brook-Digdegush river.....								10,000			
Digdegush river.....								51,000			
Disappointment or Mistake lake.....							20,000				
Doak brook-St. Croix river.....								5,000			
Echo lake.....									4,000		
Big Eel brook.....								3,000			
Little Eel brook.....								3,000			
Green Brown brook-Kanus river.....								10,000			
Hitching brook-Digdegush river.....								10,000			
Kerr lake.....								20,000			
Lake Utopia.....							50,000			25,000	
Leland pond.....							10,000				
Lepreau river.....							30,000				
Linton stream-Magaguadavic river.....	100,000							5,000			
McClary brook-St. Croix river.....							40,000				
McDougall lake.....									10,000		
Magaguadavic river.....	200,000										
Murchie brook-St. Croix river.....											
New river.....											
Red Rock lake.....											
St. Patrick lake.....									15,000		
St. Stephen rearing pond.....											
Seal Cove brook.....								6,000	1,000		
Sparks lake.....								3,000			
Spear brook-Lake Utopia.....								10,000			
Stein lake.....								30,000			
Welch lake.....								10,000			
Whale Beach pond.....								5,000	4,000		
Kings Co.—											
Fenwick lake.....								5,000			
Hall brook-Kennebecasis river.....									3,000		
Hammond river.....						30,000		10,000			

DEPARTMENT OF FISHERIES

PRINCE EDWARD ISLAND
KELLY'S POND HATCHERY

	Atlantic salmon			Speckled trout			
	Advanced fry	Fingerlings		Advanced fry	Fingerlings		
		No. 1	No. 2		No. 1	No. 2	No. 3
Kings Co.—							
Big pond.....		50,000			4,800		
Black pond.....					4,000		
Cardigan river.....						5,800	
Coogan stream-Morell river.....					10,000		
Creed's pond-Sturgeon river.....					5,000		
Fisher brook-Morell river.....		13,000					
Fortune river.....					20,000		
Fox river.....					5,000		
Goose river.....					10,000		
Hay river.....					10,000		
Head of Hillsborough river.....		51,000					
McCaskil river.....		30,000					
McKinnon brook-Morell river.....					10,500		
McRae's pond-Montague river.....					5,000		
Midgell river.....		51,000	15,000				
Montague pond.....					10,000		
Montague river.....	51,600	30,000					
Mooney's bridge-Morell river.....		35,000					
Morell river.....	197,800	120,800	30,370				
Naurage river.....	51,000	65,000					
North lake.....					4,800		
Pool's pond-Lower Montague.....					5,000		
Quigley's stream, below mill—St. Peters bay.....	51,000						
Red bridge-Morell river.....		35,000					
Schooner pond.....		30,000					
Sturgeon river.....		35,000					
Warren's pond-Head of East River.....					5,000		
Prince Co.—							
Bain creek.....					5,000		
Barbara Weit river.....					3,000		
Barlow pond-Grand river.....						5,000	
Black brook.....						2,400	
Black pond.....					5,000		
Cain stream-Mill river.....						5,000	
Carr stream.....						5,000	
Clark's pond-Wilmot river.....					5,000		
Dunk river.....					15,000		
Fitzgerald's pond-Grand river.....						6,000	
Foxley river.....						5,000	
Gard stream-Mill river.....						9,800	
Green stream-Miminegash river.....					5,000	5,000	
Harper's pond.....					5,000		
McNally's pond.....						5,000	
McWilliam's pond.....					5,000		
Nail pond.....					5,000		
Old Wool Mill pond-Tryon river.....					5,000		
Pierre Jacques river.....					5,000		
Scales pond.....					5,000		
Seacow pond.....						5,000	
Sheep river.....					5,000		
Skinner's pond.....						5,000	
Trout brook-Mill river.....						5,000	
Tuplin's pond-Indian river.....						5,000	
Wright's pond.....						5,000	
Queens Co.—							
Bagnall's pond.....					5,000		
Bell river.....					10,000		
Blooming Point pond.....					10,000		
Campbell's pond-New Glasgow.....						6,000	
Clark's stream-East river.....					5,000		
Coles pond-North river.....						3,515	
Crooked creek.....					5,200		
Dixon's pond-Sable river.....					5,000		
Hardy's pond.....					8,000		
Hope river.....					10,000		
Leard's pond-Crapaud river.....					5,000		
McPherson's pond-Flat river.....					5,000		

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PRINCE EDWARD ISLAND—Concluded KELLY'S POND HATCHERY—Concluded

	Atlantic salmon			Speckled trout			
	Advanced fry	Fingerlings		Advanced fry	Fingerlings		
		No. 1	No. 2		No. 1	No. 2	No. 3
Queens Co.—Concluded							
McPherson's pond-Pinette river.....					10,000		
Nunn's pond-Mr. Walter Burke, Winsloe.....				1,000	1,000		
Parson's pond-Trout river.....					10,000		
Rackham's pond-Wheatley river.....					11,000		
Sherry brook-Johnston river.....					5,000		
Vessey brook-Winter river.....					20,000		30,940
Winter river.....			15,000		8,000		
Winter river, north branch.....					5,000		
	351,400	545,800	60,370	1,000	325,300	83,515	30,940
Total distribution.....						1,398,325	

BRITISH COLUMBIA ARGENTA SUB-HATCHERY

Kootenay lake—	Kamloops trout fry
Argenta slough.....	100,000
Big slough.....	50,000
East shore.....	63,495
Fry creek bay.....	50,000
Lardeau bay.....	50,000
Schroeder bay.....	50,000
Total distribution.....	363,495
	363,495

BEAVER LAKE EYEING STATION

	Kamloops trout	
	Eyed eggs	Fry
Private ponds, Mr. C. H. Haskins, East Kelowna.....	2,000	
Alex. Mountain lake-Island lake.....		3,000
Beaver lake.....		30,000
Crooked lake.....		10,000
Dee lake.....		5,000
Deer lake.....		5,000
Doreen lake-Aberdeen lake.....		10,000
Echo lake.....		4,000
Island lake.....		10,000
Kelowna rearing ponds, Kelowna Rod and Gun Club.....	300,000	50,000
Lost lake-Deer lake.....		3,000
Okanagan lake.....		253,280
Rod lake-Crooked lake.....		3,000
Round lake.....		2,000
Wilma lake-Dee lake.....		3,000
	302,000	391,280
Total distribution.....		693,280

CULTUS LAKE HATCHERY

	Cutthroat trout		Coho salmon Eyed eggs	Kamloops trout		Steelhead salmon			Sockeye salmon	
	Eyed eggs	Fry		Eyed eggs	Fry	Fry	Advanced fry	Fingerlings No. 1 No. 2	Eyed eggs	Fry
Cultus lake.....										
Spring creek.....			1,063,053							3,551,050
Devils lake.....					4,000					
Echo lake.....					19,140					
Elbow lake.....					5,000					
Hatchery creek-Sweltzer creek.....				10,000						
Liumchin lake.....				20,000						
Loch Erroch-Fraser river.....				30,000					74,400	
Silver lake.....				30,000						
Stacey lakes.....				30,000						
Stave lake.....				30,000						
Cannell lake.....				10,000						
Cedar lake.....										
Cypress lake.....		29,567				144,795	1,000	23,840		
Sweltzer creek.....	36,325									
Sweltzer creek, lower.....										
	36,325	29,567	1,063,053	170,000	28,140	144,795	1,000	23,840	74,400	3,551,050

Total distribution..... 5,155,860

LLOYD'S CREEK SUB-HATCHERY

	Kamloops trout	
	Eyed eggs	Fry
Cloyah lake, near Prince Rupert.....	40,000	.....
Flora lake, N. D. Bothwell, Esq., Britannia Beach, B.C.....	5,000	.....
Link lake, near Ocean Falls.....	75,000	.....
Prudhomme lake, near Prince Rupert.....	100,000	.....
Hope district—		
Coquihalla river.....	35,000	.....
Crown lake.....	20,000	.....
Kelly lake.....	50,000	.....
Pavilion lake.....	50,000	.....
Scham or Haig lake.....	5,000	.....
Silver creek.....	50,000	.....
Kamloops district—		
Andy lake.....		5,000
Aylmer lake.....		10,000
Badger lake.....		5,000
Beaver lake, near Devick.....		2,000
Black Pines lake.....		2,000
Crystal lake, near Clearwater.....	30,000	.....
Devick lake.....		3,000
Eleanor lake, near Blue river.....	15,000	.....
Fish lake.....		250,000
Genier lake.....		10,000
King lake.....		5,000
Knouff lake.....		5,000
Kullach lake.....		6,447
Latremouille lake, near Mt. Olie.....	30,000	.....
McConnell lake.....		5,000
Monte lake.....		75,000
Paul lake.....		175,000
Peterhope lake.....		10,000
Pillar lake.....		25,000
Pinantan lake.....		150,000
Red lake.....		30,000
Rhoda lake.....		5,000
Pacific Great Eastern Railway, Pemberton district—		
Alta lake.....	30,000	.....
Bob lake.....	5,000	.....
Evans lake.....	5,000	.....
Fairy lake.....	20,000	.....
King lake.....	5,000	.....
Marshall lake.....	30,000	.....
Nita lake.....	5,000	.....
Woods lake.....	10,000	.....
Prince George district—		
Cluculz lake.....	30,000	.....
Kathlyn lake.....	50,000	.....
Lascelle lake.....	15,000	.....
Moose lake.....	50,000	.....
Ness lake.....	10,000	.....
Small lake.....	10,000	.....
Yellowhead lake.....	20,000	.....
Quesnel district—		
Crystal lake.....	40,000	.....
Curry lake.....	2,000	.....
Lac LaHache.....	30,000	.....
Machete lake.....	20,000	.....
McLeese lake.....	20,000	.....
Watch lake.....	20,000	.....
Provincial Game Board, Vancouver.....	400,000	.....
Revelstoke Rod and Gun Club, Biological Station, Taft.....	120,000	.....
Shuswap district—		
Johnston's pool, near Eagle bay, (A. T. Johnston, Esq.).....		1,000
Canoe creek-Shuswap lake.....	50,000	.....
Gardners lake, Salmon Arm (Gardner Lake Fishing Club).....		2,000
Granite creek-Shuswap lake.....	140,000	.....
Loon lake.....		9,000
Mabel lake.....		30,000
McGuire lake.....		5,000
Palmer creek-Salmon river.....	50,000	.....
Reneickers creek-Shuswap lake.....	80,000	.....
Salmon river.....	125,000	.....
Scotch creek-Shuswap lake.....	320,000	.....
Shuswap lake.....		113,119
White lake.....		30,000
Vancouver district—		
Powell lake.....	100,000	.....

DEPARTMENT OF FISHERIES

LLOYD'S CREEK SUB-HATCHERY—*Concluded*

	Kamloops trout	
	Eyed eggs	Fry
Vancouver island—		
Boston lake.....	20,000	
Cameron lake.....	70,000	
Campbell lake.....	50,000	
Cowichan lake hatchery.....	60,000	
Great Central lake.....	70,000	
Long lake.....	10,000	
Sproat lake.....	70,000	
Telford creek-Shawinigan lake.....	50,000	
	2,717,000	968,566
Total distribution.....	3,685,566	

NELSON HATCHERY

	Kamloops trout		Ken- nerly's salmon fry	Speckled trout Two years
	Eyed eggs	Fry		
Grand Forks district—				
Christina lake.....	40,000			
Granby river.....		35,000		
Smelter lake.....		35,000		
Greenwood district—				
Boundary creek-Kettle river.....	30,000			
Conkle lake.....	20,000			
Jewel lake.....		30,000		
Kettle river (above Westbridge).....	40,000			
Kettle river, west fork.....	40,000			
Wildgess or Loon lake.....		20,000		
West Kootenay—			35,000	
Anderson creek.....		30,000		
Arrow lake, lower (at Edgewood).....		30,000		
Arrow lake, lower (Syringa-Robson district).....		30,000		
Arrow lake, upper.....		30,000		
Barratt lake.....	5,000			
Bear lake.....		15,000		
Boundary lake.....				1,292
Box lake.....		15,000		
Canyon creek.....		15,000		
Columbia river (below Castlegar).....		25,000		
Crawford creek-Kootenay river.....		20,000		
Eight Mile creek-Kootenay river.....			35,000	
Falls creek.....	10,000			
Four Mile creek-Kootenay river.....			25,000	
Grays creek.....		10,000		
Hidden creek.....	20,000			
Kokance creek.....			370,000	
Kootenay lake, west arm.....		90,000		
Kootenay river.....		60,000		
Kootenay river, below Slocan pool.....		25,000		
Peter lake, Nelson Golf Course.....				50
Porto Rico lake.....	15,000			
Redfish creek.....			160,000	
Rosebud lake.....		20,000		
Salmon river.....		25,000		
Seven Mile creek-Kootenay river.....			40,000	
Sitkum creek.....			140,000	
Six Mile creek-Kootenay river.....			180,560	
Slocan lake.....		50,000		
Slocan river.....		35,000		
Slocan pool.....		61,829		
Snowshoe lake, Mr. A. Coates, Whatshan lake....		4,000		
Sproule creek.....			75,000	
Summit lake.....		20,000		
Ten Mile creek-Slocan lake.....		10,000		
Unnamed creek-Crawford bay.....		10,000		
Whatshan lakes.....		30,000		
Woodbury creek.....	15,000			
	235,000	750,829	1,060,560	1,342
Total distribution.....	2,047,731			

PENASK LAKE SUB-HATCHERY

	Kamloops trout	
	Eyed eggs	Fry
Cranbrook hatchery.....	405,500	.....
Provincial Game Board, Vancouver.....	390,000	.....
Douglas lake.....		10,000
Jackson lake.....		5,000
Minnie lake.....		10,000
Mystery lake.....		5,000
Mud lake-Penask lake.....		20,000
Penask creek.....		36,860
Peterson lake.....		5,000
	795,500	91,860
Total distribution.....		887,360

SMITHS FALLS SUB-HATCHERY

	Cutthroat trout			Sockeye salmon		Steelhead salmon yearlings
	Eyed eggs	Fry	Three years	Eyed eggs	Fry	
Provincial Game Board, Vancouver.....			32			
Vancouver island-Maggie lake.....				1,500,000		
Atchelitz river.....	25,500					
Brown creek-Vedder river.....	40,000					
Clayburn river.....	14,000					
Cultus lake.....					8,869,144	
Hatzic lake.....	50,000					
Haywood lake.....	50,000					
Hope slough-Fraser river.....	59,000					
Kanaka creek.....	25,000					
Liumchin creek, above falls.....		10,000				
Marshall creek-Sumas river.....	25,000					
Miami river-Harrison lake.....	55,000					
Nicomekl river.....	73,500					
Popkum lake.....	40,000					
Rexford creek-Vedder river.....	100,000					
Salmon river, Langley.....	40,000					
Silver creek.....	25,000					
Sweltzer creek.....	60,040	37,600		992,000		12,107
Sweltzer creek, lower.....				797,694		
Unnamed stream, Matsqui slough-Fraser river.....	30,000					
Vedder river.....	28,000					
Woodruff creek-Vedder river.....	90,000					
Yarrow creek-Sumas river.....	20,000					
	850,040	47,600	32	3,289,694	8,869,144	12,107
Total distribution.....						13,068,617

SUMMERLAND SUB-HATCHERY

	Kamloops trout	
	Eyed eggs	Fry
Kettle river—		
McCulloch lake.....	10,000	
Caribou lake.....	3,000	
Idebelt lake.....	3,000	
Pear lake.....	4,000	
Nicola river—		
Brookmere lake.....		15,000
Murphy lake.....		4,000
Okanagan district—		
Brent lake.....		5,000
Coldstream creek-Long lake.....	50,000	
Deep creek.....	30,000	20,000
Dog (Shaha) lake.....	55,000	40,000
Eneas lake.....		10,000
Glen lake.....		5,000
Long lake, Vernon.....		25,000
Okanagan lake.....		144,220
Osoyoos lake.....	40,000	
Penticton ponds (Penticton Rod and Gun Club).....		20,000
Shannon lake.....		5,000
Silver lake.....		5,000
Trepannier creek.....		20,000
Vaseux lake.....	18,100	
Vernon ponds (Vernon Fish and Game Association).....		20,000
Woods lake.....		20,000
Shuswap district—		
Echo lake.....		5,000
Mabel lake.....	100,000	
Similkameen river—		
Blue lake.....		10,000
Burgesson lake.....		10,000
Clearwater lake.....	20,000	
Davis lake.....		10,000
Link lake.....		5,000
McKenzie lake.....		10,000
Missezula lake.....	10,000	
Osprey lake.....		5,000
Otter lake.....	40,000	
Princeton rearing ponds (Princeton Rod and Gun Club).....		96,000
Taylor lake.....		5,000
Wolf lake.....		30,000
	383,100	544,220

Total distribution..... 927,320

APPENDIX No. 3

REPORT ON OYSTER CULTURE WORK UNDER THE DEPARTMENT
OF FISHERIES FOR THE YEAR 1937-38BY A. W. H. NEEDLER, PH.D., ASSOCIATE ZOOLOGIST,
FISHERIES RESEARCH BOARD

In the fiscal year 1937-38 oyster culture work was carried on by the Department of Fisheries in Prince Edward Island and in Nova Scotia. Work under the present program has been in progress in Prince Edward Island since 1928. The greatest development of oyster farming has been in the Malpeque Bay region and investigations and experimental farming in co-operation with the Fisheries Research Board have centred at the Prince Edward Biological Station at Ellerslie. General headquarters for the work as a whole have been maintained there and much of the information and experience gained in Prince Edward Island is applicable in Nova Scotia. Intensive work has been started in the Bras d'Or lakes near Orangedale and on the Northumberland Strait coast at Wallace and Malagash to study the special problems of those regions. While the work is for convenience, reported below separately for the two provinces, it is made one by the common value of the results of investigations, by common planning and by the use of personnel and other resources in common.

A. PRINCE EDWARD ISLAND

The Dominion Government by an agreement with the Province of Prince Edward Island in 1928 obtained jurisdiction over the island's oyster areas and undertook to develop its oyster industry. As the most important step in that direction the establishment of oyster farming was planned in those suitable areas which did not support a public fishery. Experimental oyster farming was commenced by the department in 1928 and scientific investigations by the Fisheries Research Board (then the Biological Board of Canada) in 1929, and these have been continued in close co-operation. The leasing of oyster ground was started in 1931 and development of oyster farming has been rapid, especially in the Malpeque Bay region.

For a more detailed review of the earlier course of the program reference may be made to appendices 6 and 5 of the Annual Reports of the Department of Fisheries for 1935-36 and 1936-37, respectively. The salient features of the development in 1936-37 are summarized here.

1. *Development of Leased Areas in 1937.*—Table I, which follows, summarizes the development of oyster farms in Prince Edward Island in 1937. It is compiled from statements obtained from each oyster farmer and, while complete returns were not always obtainable and the figures are, therefore, sometimes less than the truth, it gives a reliable conservative approximation.

The total oyster farming activity showed a great increase again in 1937, for which the Malpeque-Cascumpeque region was again largely responsible. A continuance of the mortality in the Charlottetown region caused a further decline both in the public fishery and in oyster farming activity in the eastern part of the province. Owing largely to the closure of Bedeque bay inside Indian and Phelan points to direct marketing for public health reasons, a number of areas were leased in neighbouring coves outside the polluted area and oysters

were transferred to them for purification. Active oyster farming in Wolfe inlet and Brae harbour was held up to some extent pending definition of reserves for quahaug fishing. There has been some interest in the potentialities of other inlets in the province but no substantial development in 1937 in any new ones other than the Bedeque Bay region.

TABLE I.—SUMMARIZING THE DEVELOPMENT OF AREAS UNDER CULTIVATION IN PRINCE EDWARD ISLAND IN 1937

Region	Year	Number of areas under cultivation	Approximate total area (acres)	Oysters planted (bbl.)	Oysters sold (bbl.)	Shells used for spat collection (bu.)	Card-board spat collectors (No.)
Malpeque-Cascumpeque.....	1932	26	110	254	0	1,500	0
	1933	47	203	935	181	1,600	0
	1934	85	388	1,516	434	1,050	1,254
	1935	101	453	1,303	979	645	3,350
	1936	202	862	3,342	1,093	1,011	13,600
	1937	336	1,314	5,192	1,948	25,000	55,600
Rustico to Savage bays.....	1933	9	41	428	50	400	0
	1934	13	63	595	92	2,650	0
	1935	26	116½	750	145	4,300	0
	1936	29	128	38	1	930	440
	1937	31	137	21	0	25	0
Pinette river.....	1935	10	15	126	0	Some	0
	1936	11	17	47	3	Some	0
	1937	11	17	13	0	125	0
Brudenell river.....	1935	1	1	10	0	0	0
	1936	1	1	6	0	0	0
	1937	1	1	0	0	0	0
Murray Harbour.....	1937	1	5½	2	0	0	0
North Lake.....	1937	3	6	7	0	0	0
Brae Harbour and Wolfe Inlet.	1937	15	30	6	0	0	0
Bedeque Bay area.....	1937	65	179	1,934	0	0	0
Total.....	1932	26	110	254	0	1,500	0
	1933	56	244	1,363	231	2,000	0
	1934	98	451	2,111	526	3,700	1,254
	1935	138	585½	2,189	1,124	5,000	3,350
	1936	243	1,008	3,433	1,097	1,900	14,040
	1937	463	1,689½	5,175	1,948	25,000	55,600

2. *Malpeque-Cascumpeque Region.*—Conditions continued promising in 1937 in this region where oyster farming first became established and where the benefits of the experimental farming and other activities of the department have been felt most directly. Additional information on the industry in this region is given in Table II.

The total expenditure in 1937 in connection with the development of private areas in this region was over \$33,000, an increase of more than 70 per cent over 1936. The yield also increased more than 75 per cent but the value of the oysters remained only about half the expenditure. The industry as a whole is spending now to build up a high production in future and there is no general tendency to deplete stocks but rather to hold large quantities in reserve. Continued expansion is in view in 1938.

A notable development in 1937 was the very great increase in spat collection especially with concrete-coated cardboard collectors. The "set" was on the whole satisfactory and presaged a great expansion of tray rearing in 1938. As

was predicted, spat collection and intensive rearing of small oysters is increasing in relative importance as the industry grows and picking of naturally produced small oysters along the shores is becoming a less important source of planting stock. It is expected that this trend will continue.

It is impossible to give adequate figures for many aspects of the development work such as, for example, cleaning and hardening of ground, removal of mussels or starfish, separation of clusters, spat collection through cleaning at the proper time, transfers of oysters from producing and growing grounds to maturing grounds, etc. In these ways much effective work is being done.

Starfish continue to be one of the greatest obstacles to successful oyster farming and the department offered a bounty of 25 cents per gallon of starfish taken in Malpeque bay. This was done as an experiment in the hope that it would encourage the landing of starfish caught incidentally by lobster fishermen. The bounty was paid on 264 gallons containing probably a quarter of a million starfish or more.

Table III summarizes the production of oysters in the Malpeque-Cascumpeque region during the past five years and shows the continued rapid increase in the total yield.

TABLE II.—OYSTER FARMING IN THE MALPEQUE-CASCUMPEQUE REGION IN 1935, 1936 AND 1937

	1935	1936	1937
Number of areas under cultivation.....	101	202	336
Barrels of oysters planted.....	1,303	3,342	3,192
Barrels of oysters sold.....	979	1,093	1,948
Cardboard spat collectors used.....	3,350	13,600	55,600
Wages paid for development of areas.....	\$2,137	\$ 6,077	\$11,532
Money spent for materials used in development.....	\$1,665	\$ 7,351	\$14,305
Days' work by lessees.....	1,126	3,321	4,300
Value of time spent by lessee at \$1.75 per day.....	\$1,971	\$ 5,812	\$ 7,525
Estimated total value of work and materials used in development.....	\$5,773	\$19,240	\$33,362

As the returns could not be made entirely complete the figures are conservative approximations.

Rentals paid to the department (amounting to \$753.31 in 1937-38) are not included.

TABLE III.—PRODUCTION OF OYSTERS IN THE MALPEQUE-CASCUMPEQUE REGION

Year	From the Depart- ment's Areas	From Private Areas	Total
	bbls.	bbls.	bbls.
1933.....	327	181	508
1934.....	422	434	856
1935.....	332	979	1,311
1936.....	454	1,093	1,547
1937.....	401	1,948	2,349

3. *Mortality of Oysters in the Charlottetown Region.*—The mortality of oysters in the past two years, principally in the Charlottetown region, is one of the most serious occurrences in the Canadian oyster industry, not only on account of its immediate effects but because it is apparently due to a contagious disease and, consequently, may be expected to spread further in the future.

There is reason to believe that a slight mortality may have occurred in Hillsborough river (a tributary of Charlottetown harbour) in 1935. A very serious mortality occurred there and in neighbouring north shore bays in 1936. Areas in Hillsborough river formerly supporting a fishery of some thousands of barrels produced no commercial catches in 1936. The mortality was of the same order in Brackley bay and occurred also in Tracadie, Savage and Rustico bays.

The spread of the mortality was followed closely in 1937. It appeared early in August in Elliott (West) and Yorke (North) rivers, tributaries of Charlottetown harbour not seriously affected in 1936, and over half of the oysters in these inlets died before winter. In Pownal bay and in Vernon, Orwell and Pinette rivers the mortality was first observed in October and reached varying proportions estimated at from 10 to 35 per cent. Further mortality also occurred in 1937 among survivors in the areas affected in 1936; and in Rustico bay it spread to Chapel creek.

Oyster spat which settled on cardboard collectors in Enmore river in 1936, and were reared on floating trays there in 1937, had a heavy mortality in the late summer with the same symptoms as those associated with the Charlottetown mortality. This suggests that the same disease is present there and offers an explanation of the absence of oysters in commercial quantities in recent years and of the failure of small oysters collected along the shore to survive to marketable size when planted on deep firm grounds.

An epidemic disease is the only explanation of the mortality which appears acceptable. There is evidence that the micro-organisms responsible for the epidemic which destroyed the fishing in the Malpeque-Casumpeque region, commencing in 1915, are still in that region although the present oyster population there is resistant. That disease may have been carried to Hillsborough and Enmore rivers incidentally by the movements of fishermen and transferred from the former to the north shore bays with oysters to be planted on leased areas. This is the only source of such a disease definitely in view and the symptoms and course of the epidemic exhibit similarities. If the disease is the same and Malpeque stock resistant the latter might be used to advantage in re-establishing oysters in the affected inlets.

Professor Roy Fraser, of Mount Allison University, Sackville, N.B., very kindly carried on an intensive study of diseased and normal oysters. Bacteriological and histological investigations failed to discover a bacterium responsible for the disease. A protozoan or virus may be the cause of the disease and such negative results can never be wholly conclusive. It is hoped that further investigations will reveal the micro-organism responsible.

Experimental transfers were made in 1937 of Malpeque oysters and of oysters from an unaffected area to Brackley bay and Hillsborough river, respectively, to test the resistance of Malpeque stock to the disease. In view of the apparent slowness of the disease to spread, the results of these experiments cannot yet be considered conclusive although the Malpeque oysters transferred to Brackley bay suffered no noteworthy mortality. These investigations will be continued and extended in 1938.

If the present course of the mortality continues it may be expected to destroy the public fishery throughout the Charlottetown region and Pownal bay and it may spread to other areas which it has not yet reached, not only in Prince Edward Island but also in Nova Scotia and New Brunswick. To lessen chances of the latter, regulations have been passed prohibiting the planting in the waters of any of these provinces of oysters taken outside. Such measures may, however, be ineffective and the risk remains.

In view of the probable spread of the mortality it is obviously unwise to spend effort growing oysters in areas close to those affected and using stock which has not been exposed to the mortality and proved resistant. As a result, oyster farming activity in the eastern part of the province has practically

ceased and cannot be expected again until Malpeque stock is definitely shown to be resistant to the Charlottetown mortality or until time has elapsed for the development of local resistant stock. For development of small outlying areas in the western part of the province Malpeque stock is more promising than the limited stocks in view of the apparent resistance to the earlier Malpeque disease which may be identical with the recent Charlottetown disease. Bedeque bay has large stocks not known to have been exposed yet to the Malpeque or Charlottetown disease and consequently in danger of a similar mortality.

4. *Bedeque Bay*.—The activity in 1937 in the leasing of oyster ground and the planting of oysters in Salutation, Sedgewick, and Sunbury coves in the Bedeque Bay area was associated with closure of the inner part of Bedeque bay to fishing of oysters for direct marketing. As the Department of Pensions and National Health had determined that it was so contaminated as to make the oysters unsafe to use as a raw food, that portion of Bedeque bay inside Indian and Phelan points was closed to fishing except for purification by relaying on approved areas or by chlorination. Grounds for relaying oysters were sought in the Bedeque Bay area outside of the polluted part.

Salutation, Sedgewick and Sunbury coves offered some suitable grounds but a decision regarding their freedom from pollution was not received from the Department of Pensions and National Health until late in the summer. Time was, therefore, too short to complete all of the many applications for leases in time for the autumn fishing season. Many areas were surveyed, however, and over 1,900 barrels of oysters from the polluted part of Bedeque bay were planted on them, as shown in Table I.

In addition to deep, firm bottoms free from shifting which occurred in Sedgewick and Sunbury coves, some more doubtful bottoms were tried by lessees or applicants after a warning of the risks involved. These included very shallow grounds exposed to risk of winter damage and a channel with bottom in danger of shifting in Salutation cove, and some sandy bottoms elsewhere sufficiently exposed to be in danger of shifting.

While the relaying of oysters for purification has played an important part in the initiation of the development in the coves in the Bedeque Bay area, this may in future be supplemented by production of oysters by ordinary cultural methods.

5. *Experimental Farming*.—Experimental farming in close co-operation with the investigations by the Fisheries Research Board has been carried on in Bideford river (tributary to Malpeque bay), where areas have been set aside for that purpose and where the board has established the Prince Edward Island Biological Station at Ellerslie. The scientific investigations by the board have been designed to develop oyster cultural methods and to provide a sound basis for knowledge for the administration and development of the industry. The department has carried out larger scale trials of methods based on the scientific investigations.

The great development of oyster farming in the region in 1937 has been shown above and the industry is still expanding. Our knowledge of the oysters and the conditions affecting their growth and reproduction must be made to keep pace with the growing and changing industry. The development and demonstration of further improvements in oyster cultural methods must be continued; and these are the aims of the experimental farming.

While maintaining headquarters for the work as a whole at Ellerslie, the special needs of other localities are borne in mind. Many of the results obtained at this central experimental farm are applicable to other localities with minor variations or none, but investigations, demonstrations or operations for the provision of stock are carried out elsewhere to meet special local needs. Thus in

1937 intensive investigations were centred at Orangedale, N.S., and at Wallace and Malagash, N.S., where a general attack is being made on the oyster cultural problems of the Bras d'Or lakes and the Gulf of St. Lawrence coast of Nova Scotia (see below); and investigations and experiments in connection with the oyster mortality were carried on in the Charlottetown region. It is pointed out, however, that the extension of intensive work to small outlying areas is limited by the expense and by availability of the trained personnel necessary for proper supervision.

6. Results of Investigations and Experiments to Improve Oyster Cultural Methods.—The results of investigations and experiments to extend our knowledge of the biology of the oyster and to develop improvements in oyster cultural methods are reported in detail elsewhere. Space permits only a brief mention of some aspects of this work in 1937.

The great increase in the use of concrete-coated cardboard collectors has been noted above and is clearly shown in Tables I and II. There has been a corresponding increase in the rearing of separate spat on trays necessary to make best use of the collectors. The widespread adoption of this method and the great increase promised by the large numbers of collectors used in 1937 have made the development of cheaper modifications very important. In 1937 a floating tray a foot deep with wood bottom and cover and wire cloth ends was tried with good success. The results were as good as with the floating trays with wood covers and wire cloth bottoms which had been used hitherto. A greater depth (12 inches as compared with 4 to 6 inches) is required with the wood bottom to give adequate circulation through the ends. Such a wood-bottomed tray 4 feet by 12 feet providing good growing conditions for about 10,000 spat is much cheaper than a wire-bottomed tray of the same size and capacity, especially in cost of materials. It has an original cost of about \$5.25 (of which \$1.80 is labour) and an average annual maintenance cost of about \$2 (of which \$1.20 is labour) as compared with an original cost of about \$7.50 (of which \$1.80 is labour) and an average annual maintenance cost of about \$3.40 (of which \$1.20 is labour).

Attempts to rear separate spat on natural bottoms or shores have hitherto met with little success except in isolated instances on a small scale. Factors responsible for failure have included starfish, a growth of algæ ("moss") and silting in shallow sheltered water or shifting of bottom. In 1937 gravel flats at the north end of Little Curtain island in Malpeque bay were tried for this purpose. Several acres of coarse gravel flats, bare at extreme low tide, are protected by wide sand flats at about the same level and offer an unusually good combination of firm bottom and freedom from silting or excessive growth of algæ. Pieces of cardboard collectors with 1936 spat, separate 1936 spat and two sizes of small 1935 oysters reared on trays were tried. Growth was slightly better than in the floating trays, the shells heavier and shape better. The pieces of collectors were badly scattered but over 75 per cent of the other oysters were recovered, the larger oysters being least scattered. As the cost of producing separate spat is only about one-third of the cost of tray-reared oysters even a 75 per cent survival means reduced expense. The oysters were grown at a concentration which gives an acre of the gravel flats the same capacity as about 400 floating trays 4 feet by 12 feet. It is expected that these flats will be used to an important degree in the near future for the rearing of small oysters for maturing on deeper grounds.

In 1937 further progress was made in the development of a cheap preservative for wood against shipworms. The effectiveness of the mixture of tar, copper oleate and benzol, which was given a preliminary trial in 1936, was confirmed by further experiments and by use on many rearing trays under

ordinary working conditions. It was found, too, that stove oil could be substituted for the benzol without reducing the effectiveness, although it makes the mixture somewhat more difficult to prepare. This makes a further reduction in the expense and a protection against shipworms has been developed which is as effective as copper paint at less than a tenth of the cost. Like copper paint it is, of course, effective only if the surface of the wood is covered completely throughout the dangerous season.

Through the work of Mr. J. C. Medcof, as a research assistant for the Fisheries Research Board, the basis for prediction of the times when oyster spat settles was improved. It is planned to extend this work in 1938 to include prediction of "sets" in a number of places where oyster growers wish to collect spat. While reasonably safe prediction of the time of the "set" can be made, we cannot as yet make any reliable prediction of its density. In spite of this such predictions are expected to increase the efficiency of spat collection and avoid wasted effort. In view of the great increase in spat collection shown in Tables I and II this is an important service to the industry.

Field Day for Prince Edward Island Oyster Growers Association.—A field day was held at the biological station at Ellerslie on August 11th in co-operation with the Prince Edward Island Oyster Growers Association. This was the second such field day to be held and there was an increased attendance and great interest in exhibits illustrating many aspects of the oyster farming industry. The association was specially fortunate in having addresses from Mr. Howard Beach, president of the Oyster Growers and Dealers Association of North America and secretary-treasurer of the National Shellfisheries Association, and from Mr. J. R. Nelson, manager of an oyster producing company in Warren, R.I., and formerly connected with scientific oyster work in New Jersey. Mr. Beach also very kindly lent a motion picture showing the early stages in the oyster's life history and in actual life and something of the oyster industry in New England. The field day's value in creating interest in oyster culture and disseminating information about it seemed even greater than in 1936 and a repetition is planned by the association in 1938.

Provision of Planting Stock in the Malpeque-Cascumpeque region.—In 1937 211 barrels of small or crooked oysters were sold to lessees for stocking purposes from the department's areas. There is a continually increasing demand for planting stock and it is not expected that the department will again be able to satisfy any considerable proportion of it. It will, therefore, be necessary to limit such sales in future to small quantities to any lessee or group and it seems desirable to give a preference to those who have areas so situated that it is difficult for them to obtain planting stock locally either by picking or by spat collection.

There has been an alternative source of planting stock in the department's policy of issuing permits to lessees to pick oysters for that purpose in the shallow shore zone where winter mortality is high. The policy has led to the transfer of large quantities of oysters from the shallow water into deeper water, thereby saving them from the winter killing which would otherwise have destroyed a large proportion. The quantity picked in 1936 was estimated at about 2,600 barrels. In 1937 the total quantity of oysters planted was 150 barrels less than in 1936 in spite of a great increase in the oysters from tray rearing and other sources, so that the quantity picked was some hundreds of barrels less than in 1936. As pointed out above, it is expected that this will be a relatively less important source of planting stock in the future.

During the year 5,104 concrete-coated egg-crate fillers bearing spat were sold. Owing to the poor "set" in 1936 and the small size of the spat in the spring of 1937, 3,464 bearing 1936 spat were sold at the reduced price of

five cents each. The remaining 1,640 were collectors with 1937 spat sold at the usual price of fifteen cents each. In spite of the great increase in spat collection by lessees themselves, the demand for collectors has remained so great that the department again put out enough to sell some and a considerable number were held for sale in the spring of 1938. The sale of spat is carried on by the department in order to introduce the method to the industry and to enable new participants to commence production of planting stock without unnecessary delay. It is anticipated that private operations will supply all the industry's requirements in the near future and the proportion supplied by the department is already small. The price is being maintained at a level which is believed to make it possible for private operations to compete profitably.

Revenue.—Table IV summarizes the revenue from experimental farming and provision of planting stock. In addition to the sales of small oysters and spat mentioned above marketable oysters produced in the experiments or demonstrations are sold. In 1937 the department sold 400·7 barrels of market oysters at an average price of \$8.47 per barrel, as compared with 454 barrels at an average price of \$6.41 in 1936.

TABLE IV.—REVENUE FROM EXPERIMENTAL FARMING, PROVISION OF PLANTING STOCK, ETC., IN 1937-38

	1937-38		cf. 1936-37	
	\$	cts.	\$	cts.
Sale of 1,640 cardboard spat collectors bearing spat at \$0.15.....	246	00	430	80
Sale of 3,464 cardboard spat collectors bearing spat at \$0.05.....	178	20		
Sale of wire containers for spat collectors.....	36	80		
Sale of 40,000 spat from collectors at \$0.25 per M.....			10	00
Sale of 21 barrels small reared spat from trays at \$12.00.....			252	00
Sale of 42 barrels crooked oysters for planting at \$3.00.....	126	00		
Sale of 169 barrels small oysters for planting at \$2.50.....	422	50	740	00
Sale of market oysters from experimental farm:				
204·7 bbls. ordinary at \$ 7.00 (\$5.50 in 1936-37).....	1,432	90	1,523	50
59 bbls. medium at \$ 9.00 (\$6.75 in 1936-37).....	531	00	823	50
47 bbls. medium at \$ 9.25.....	434	75		
90 bbls. select at \$11.05 (\$10.25 in 1936-37).....	994	50	563	75
Sale of 1½ bbls. 3-inch cup oysters for samples to England at \$12.00.....			18	00
Rent of starfish mops.....	2	00	0	75
Fees for resurvey of boundaries of leases.....		9 00		
Total.....	4,413	65	6,362	30

The total revenue from oyster culture operations, exclusive of rentals on leased areas, was \$4,413.65 in 1937 and all came from the Malpeque-Cascumpeque region. The addition of rentals makes the total revenues from the department's oyster culture operations in 1937 over \$5,000, all of which was from Prince Edward Island.

B. NOVA SCOTIA

In 1936 the Dominion Government entered into an agreement with the province of Nova Scotia similar to that made with Prince Edward Island in 1928. Jurisdiction over the oyster areas of the province was transferred to the Dominion which undertook development of the industry. The present oyster areas of the province fall naturally into two distinct divisions—the Bras d'Or "lakes" of Cape Breton Island and the Gulf of St. Lawrence coast. Oysters might possibly be grown elsewhere but the prospects for profitable oyster culture are believed to be much better in these two regions than elsewhere in the province.

The conditions in the Bras d'Or lakes and on the "Gulf shore" are widely different from each other and from those of the north shore bays of Prince Edward Island where investigations have been centered hitherto. As there has

been very little effort to cultivate oysters anywhere in Nova Scotia there is no body of experience on which to base plans for future development. Intensive investigations are, therefore, necessary to adapt cultural methods to the special conditions of the two regions and these are now under way. The vicinity of Orangedale in the Bras d'Or Lakes region and the Wallace-Malagash area on the "Gulf shore" have been selected for headquarters as offering the best opportunities for studying the special problems of each region and as points adjacent to the greatest present oyster industry in each case.

1. *Bras d'Or Lakes*.—A preliminary survey of the oyster areas of the Bras d'Or lakes was made in 1934 and some minor supplementary investigations were carried on in 1935. In 1936 intensive investigations were commenced which included experimental collection of spat and a much more detailed survey of conditions generally in the "lakes." In 1937 these investigations were continued and expanded to include experiments in the rearing of small oysters and transfer of oysters to a saltier area for improvement of quality.

Experiments in 1937.—In 1937 experimental spat collection again met with good success and the suitability of conditions for spat collection by methods already developed is confirmed. The region abounds in well-sheltered inlets which support most of the present oyster population and where conditions appear excellent for spat production. It is believed that little effort would be needed to supply seed stock for a much larger industry and that spat production will not limit the development.

Experiments with rearing small oysters in 1937 suggested that some modification of the methods employed in the Malpeque Bay area may be necessary. Rearing in floating trays and on shallow shores in a sheltered inlet gave poor results. This may, however, have been due to very low salinities which occurred there and which were most acute at the surface. In 1938 these experiments will be extended to include areas with less danger from this factor. In view of the natural production in the region it may be confidently expected that suitable rearing methods can be developed but further work is required before the best conditions in this locality are well understood.

The very low salinities in the Bras d'Or Lakes region mean that it will not be possible to produce in the "lakes" themselves oysters of the highest quality. It is believed that culture by proper methods could produce large quantities of oysters of good shape but the market demands a saltier flavour and harder shell than the waters of the "lakes" will produce. A preliminary trial transfer of oysters from near Orangedale to Port Hood island in 1935 gave promising results and a transfer on a larger scale was made in 1937 to St. Ann harbour where the water is as salty as in areas producing oysters of the highest quality. Improvement in flavour resulted in a few weeks, with no noticeable strengthening of the shell. The oysters remained somewhat thin. It is planned to continue the experiment in 1938 to see whether the dark colour of the mantle edge (a characteristic of Bras d'Or Lakes oysters harmless in itself but believed to affect marketing adversely) would decrease and whether the oysters would fatten better in another season. An effort will then be made to assess the increase in value produced by the transfer.

Production and Marketing.—The investigations to date have indicated that a greatly increased production of oysters of good shape would be possible with proper methods. As may be seen from the above brief summary, an attack is being made on the special oyster culture problems of the region and it is hoped that progress will be made in the development of methods adapted to local conditions and in their demonstration to the industry. The successful establishment of oyster farming depends, however, on the success of marketing.

The Provincial Government through its Marketing Board has already spent considerable effort in an attempt to obtain reliable markets and reasonably good prices for oysters from this region. Its efforts will be of no avail unless they are accompanied by efforts to improve the quality of the oysters offered for market. An experiment in improvement of quality by transfer to saltier water is in progress. It is believed that much could also be done by intelligent oyster farming in which the best grounds were used and every care taken to produce oysters of the best possible shape. This is considered the main problem of the region and the department's investigations and policies are planned with that in mind.

Leasing Policy for the Bras d'Or Lakes.—The region now supports a public fishery concentrated in the vicinity of Denys basin and the western part of St. Patrick's channel; and scattered through the same area, which presents the best prospects for the industry, are a number of leases formerly issued by the provincial government. Oyster farming can probably both increase the production and improve the quality and it is only through oyster farming that there is any prospect of a sustained expansion of the industry.

In the autumn of 1936 a visit was made to the Bras d'Or lakes by the writer in company with Chief Supervisor Sutherland and with Doctor M. Cumming, representing the Provincial Government, to formulate a policy for the region. On the basis of findings at that time, and the results of previous investigations, the leasing of grounds was advocated to encourage the production of good quality oysters and it was proposed that certain areas should be set aside which would not be leased, so that the interests of the public fishery would be protected, and that grounds should be leased elsewhere. It was, however, realized that as oysters occur so generally in the Bras d'Or lakes it would be impossible to encourage oyster culture there without leasing grounds on which some oysters did occur and to enable this the agreement between the two governments was amended slightly in the autumn of 1937.

In February, 1938, it was advertised that applications for leases would be considered and a large number have since been received. It is expected that action will be possible on many in 1938. In the details of the leasing policy in this region every effort is being made to encourage the production of oysters of good quality by the leasing of suitable grounds.

2. *The Gulf of St. Lawrence Coast.*—Intensive investigations of the conditions and problems special to the "Gulf Shore" region were commenced in 1937 in the Wallace-Tatamagouche area which is the most important producing area of the region and offers typical conditions for study. A preliminary survey of the region was made in 1936 and its results have been summarized in Appendix 5 of the annual report for 1936-37.

The region, as a whole, produces a smaller quantity but a higher quality of oysters than the Bras d'Or Lakes region. Its need is for the development of methods to increase production.

The region differs from both the Bras d'Or lakes and the north coast of Prince Edward Island in the occurrence of fairly large tides and of a number of large streams tributary to the oyster producing inlets. The large tides make tidal flats of great importance both in the natural production and in the potentialities of the region for oyster culture. The large streams produce estuarial conditions different from those hitherto studied in our waters.

In 1937 an intensive study of hydrographic conditions was commenced. General exploration of these and of the oyster population and spat collection trials indicated that modifications of spat production methods will be needed.

An area was selected in Malagash basin for experiments in the use of tidal flats for oyster culture, a field of investigation very important because of the wide flats and relatively small areas of deep, firm bottom characteristic of the

region. About nine acres of flats were set aside as a reserve for experimental purposes including a bar with a considerable natural production of small oysters. A small building was erected to house equipment and give shelter for a watchman.

As a possible means of overcoming winter mortality a dyke was constructed to retain up to eighteen inches of water over about half an acre. Its construction, based on that used in the extensive oyster dykes at Olympia, Washington, was of boards nailed to uprights driven into the bottom and banked on either side with mud, gravel and stone. Experimental plantings of oysters from the bar were made inside the dyke and at various levels on the flats outside. A small experimental planting was also made on firm bottom at a sufficient depth to escape ice in Tatamagouche bay outside the basin. Before presentation of this report it was found that the dyke had withstood the winter without serious damage and that winter mortalities inside the dyke were less than on the flats outside at the same level or on the bar. While these results are encouraging, further experiments are necessary before the effectiveness of the dyke can be known.

It is planned in 1938 to continue and extend the experiments at Malagash in the use of tidal flats. Methods of improving the bottom, growth rates and spat collection will be given special attention.

C. NEW BRUNSWICK

Pending completion of the examination of Shediac bay by the Department of Pensions and National Health no further work was done there in 1937. The work by the Biological Board and the Department of Fisheries in this area in 1932 and 1933 has served to bring some of the special problems to light, particularly the erratic local production of spat, and to provide a basis for attack on them when a decision regarding public health policy is reached.

APPENDIX No. 4

**REPORT OF INSPECTION OF FISH AND PACKAGES AND TECHNICAL
INSTRUCTION TO FISHERMEN**By J. J. COWIE, *Director*

INSPECTION OF SALTED HERRING, MACKEREL, ETC.

This inspection is carried on under authority of the Fish Inspection Act. It is required by the act that all barrels, boxes, and other containers used for packing and marketing such fish as come under its provisions must be made and marked in accordance with the regulations made under authority of the act. It is further provided that all such containers must be inspected and marked by a properly qualified officer before being bought, sold or used; also that all such fish as come under the provisions of the act must be cured, graded and packed in accordance with the requirements laid down in the regulations and before shipment the fish must be inspected and marked by an inspecting officer.

During the year under review inspections of fish and other containers were carried on by those of our regular fishery officers who were qualified and authorized to do so with the help of three specially qualified temporaries.

Atlantic Coast

During the calendar year 1937 almost four thousand inspections were made of fish curing places and curing utensils with a view to enforcing cleanliness and proper sanitary conditions.

There were 348,000 empty containers inspected and marked during the year. Of that number 322 were set aside for re-conditioning; 49 were condemned. There were 11,242 packages of alewives inspected and of these 69 were found to be below quality. Of herring there were 18,960 packages inspected. Of that number 443 were re-conditioned and 83 found below quality. There were 41,720 packages of mackerel inspected, 2,268 had to be re-conditioned and 771 were found to be below quality. Of hard cured smoked herring there were inspected 262,555 boxes. Of these 500 were found to be below quality.

The packing and marketing of oysters come under the provisions of the Fish Inspection Act. These provide that oysters may be marketed in barrels, half-barrels or boxes. The barrel must contain not less than two and one-half bushels, the half-barrel not less than one and one-quarter bushels of oysters in the shell. The boxes may be of three sizes, one to contain one and one-quarter bushels, another to contain one bushel and the other to contain one-half bushel of oysters in the shell.

When an inspecting officer is satisfied that the barrels and boxes are in accordance with the requirements and that the oysters are not below the legal size he stamps a mark on each package to show that it has been inspected.

Of oysters there were inspected 14,247 barrels and 2,498 boxes. One barrel was found to be below quality.

On September 1, 1937, there was passed by Order in Council a code of regulations for the inspection of frozen smelts in boxes. The regulations for the present apply only to Gloucester and Restigouche counties of New Brunswick, whence requests for the introduction of an inspection system came.

The inspection was established mainly for the purpose of ensuring that frozen smelts packed and marketed in boxes should be uniformly graded. The grades fixed are:—

Extra, $7\frac{1}{2}$ inches and up.

No. 1, 6 to $7\frac{1}{2}$ inches.

No. 2, $4\frac{1}{2}$ to 6 inches.

No. 3, under $4\frac{1}{2}$ inches.

When an inspector is satisfied after inspection that the smelts and boxes are such as the regulations require he marks each box in the lot inspected with the words "Graded for Size" and a number to designate the inspecting officer.

Three specially qualified men were employed temporarily as inspectors for the inspection of smelts.

There were in all 7,481 boxes of smelts inspected up to the end of 1937.

In September, 1937, there was passed by Order in Council a set of regulations covering the inspection and supervision of shucking, handling and shipping scallop meat.

These regulations were made necessary by the fact that the chief market for Canadian scallops is in the United States and as complaints had been frequent of careless methods of removing the meat from the shell of the scallop and of insanitary methods of shipping the meat to market, it was found necessary to comply with the requirements of the United States health authorities. The regulations further had to meet with the approval of the Department of Pensions and National Health of Canada.

Briefly, the regulations provide that scallops shall be shucked, handled and shipped in a manner approved by the Department of Pensions and National Health; that metal containers shall be used on the boats for holding the scallop meat; that proper means of washing the meat on the boats be adopted; that metal containers be used for shipping scallop meat to market, such metal containers to be packed in ice within a larger wooden container; that the shucking and packing shall be done on the fishing boats or in a licensed place on shore, provided the boats and shucking places on shore are equipped in compliance with the requirements of the Department of Pensions and National Health, and that duly authorized inspecting officers shall take such steps as are necessary to satisfy themselves that the regulations are complied with.

These regulations came into effect during the scallop season of 1937-38. The regulation requiring that scallop meat be shipped in metal containers, however, was held in abeyance until after the spring fishing season of 1938.

Reports from the inspecting officers show that the fishermen complied readily and willingly with the regulations, and that the result was beneficial to the industry as a whole.

In connection with the purchase of dried fish by the Department of Agriculture for distribution for relief purposes in the dried out areas of Western Canada in the fall of 1937 our fishery inspectors in the Maritime Provinces inspected for that purpose nearly 2,000,000 pounds of cod and pollock. Certificates accompanied each shipment when found to be of suitable quality. Of the quantity inspected 35,300 pounds were found to be below quality and were not shipped.

In connection with the quality of wood to be used in the making of barrels for pickled fish a regulation was passed, to become effective after January 1, 1938, providing that spruce or hardwood only should be used for staves and heading. This was found to be a hardship on coopers and fishermen on certain sections of the coast where it is difficult to secure such wood without extra expense and thereby increasing the cost of the barrel to the fishermen. Consequently the regulation has been amended to provide that coopers may use other woods, provided they are sound and of good quality.

Pacific Coast

Certain of the fishery officers on the Pacific Coast are qualified and authorized to carry on the inspection of drysalted herring. These herring are salted in tanks and remain in pickle for a certain number of days. The fish are then removed from the tanks and packed in boxes of a standard size which contain 400 pounds each. The curing of the herring and the length of time that they remain in pickle is supervised by the inspecting officer. When the fish are packed into the boxes and ready for shipment they are inspected and marked in accordance with the regulations.

The only market for these drysalted herring is in China, and owing to the unsettled conditions of that country for the past year or two the number of boxes shipped from Canada has fallen off greatly since the years from 1924 to 1930. The total quantity shipped in one of those good years was over a million boxes. During 1937 the total quantity shipped was 203,401 boxes.

INSPECTION OF CANNERIES AND CANNED FISH

Atlantic Coast

Under that part of the Meat and Canned Foods Act which deals with canned fish and shellfish, and the regulations adopted thereunder, all fish and shellfish canneries and the processes of canning are supervised and inspected during the various canning seasons by those fishery officers who are qualified to do so.

During the year 1937 there were operated in the provinces of Nova Scotia, New Brunswick and Prince Edward Island and the Magdalen Islands 239 lobster canneries, 19 clam canneries and 12 other canneries where sardines and other fish were canned.

Our inspecting officers gave close attention to the canning of lobsters. With the assistance of Doctor Ernest Hess, of the staff of the Fisheries Research Board at Halifax, the officers carried out in an efficient and painstaking manner a uniform grading of the canneries. Careful attention was given to the testing of the weight of the meat in the cans of lobsters packed at each cannery during the season, and the fact that there were found not more than sixteen instances of suspected lightweights in 1937 as against twenty-three in 1936 and twenty-nine in 1935 indicates that more care is being taken by canners to see that the legalized weight of meat is packed in each can as time goes on.

It should be noted that towards the end of the year 1937, at the request of most of the canners on the Atlantic coast, the size of the can to be used for canning clams and the weight of the contents were standardized by Order in Council.

The regulation standardizing the size of can and weight of contents reads as follows:—

"There shall be one size of cans used for canning clams on the Atlantic coast, viz., four inches in height and two and eleven-sixteenths of an inch in diameter, and each can shall contain not less than five ounces avoirdupois of drained clam meat."

Pacific Coast

As on the Atlantic coast, the fishery officers who are qualified to do so inspect all Pacific fish and shellfish canneries and report regularly during the season on the sanitary conditions under which operations are carried on at each. There were operated 37 salmon canneries, 1 clam cannery and 2 other fish canneries during the year 1937.

As was explained in the previous year's report an inspection of all canned salmon is carried on by a staff consisting of a chief chemist and two regular laboratory assistants, and a part-time assistant during the busy season. The inspection is carried on at a laboratory equipped and maintained by the department at Vancouver.

During the year 1937 there were inspected 1,635,720½ cases; that is to say, samples were drawn from each lot presented for inspection. The whole pack was found to comply with the standard requirements of fresh, firm, well packed and in good merchantable condition, with the exception of 29,950½ cases, mostly pinks, or a percentage of approximately one and one-half, which were found to be Grade B quality.

INSTRUCTION IN FISH CURING

Atlantic Coast

The instruction of fishermen on certain parts of the Atlantic coast in the curing of cod in pickle for the production of boneless fish and in curing cod in the Gaspe style that has been carried on for several years, was continued during 1937.

Cod Curing in Pickle.—This instructional work was carried on in districts of Nova Scotia and Prince Edward Island from where requests for such instruction had come and where fishermen and producers were prepared to follow the advice and instruction given. This work has greatly improved the quality of codfish prepared for conversion into boneless fish, with the result that the demand for the product by those who cut fish into boneless in Canada, as well as the United States, has greatly increased, thus relieving the very congested conditions in the dried fish markets.

Mr. George R. Earl, who is in charge of this work, has been experimenting with a new process of packing and marketing boneless codfish put up in one-pound cans vacuum treated. It would appear that there is a decided opening, particularly in the United States, for salt codfish prepared by this method.

Gaspé Cod Curing.—Instruction in this style of curing was continued at the Magdalen Islands and in the county of Gloucester, New Brunswick, chiefly on the islands of Shippegan and Miscou. One instructor was employed at the Magdalen Islands and another in Gloucester county.

Their instruction consisted of visiting the beaches and landing places and demonstrating to the fishermen the proper method of splitting, washing and salting their fish. The drying places were also visited and the methods of drying supervised. Afterwards when the fish were being prepared for shipment instruction was given as to the packing and grading of the fish.

EDUCATIONAL COURSES OF INSTRUCTION

Atlantic Coast

The Fisheries Research Board arranged to continue the courses of instruction given to fishermen and to fishery officers at Halifax as in past years. During the year 1937 it was not found possible to have one within the limits of the year. A three weeks' course was, however, arranged to be given in the month of April, 1938.

Arrangements were made to run a three weeks' course to fishermen, similar to the one held in the previous year, at the Fisheries Research Board's Station at Grand river, Gaspé, beginning early in May, 1938. Details showing the nature of the instruction given at both Halifax and Gaspé will appear in the next annual report.

Pacific Coast

At the request of fishermen on the west coast of Vancouver Island the Fisheries Research Board arranged to give a series of lectures on subjects which would be of primary interest to the fishermen of that part of the west coast. Consequently, members of the staff of the board's station at Nanaimo held

meetings in the Norway Hall, Port Alberni, on December 8, 9 and 10, 1937. Much interest was shown by the fishermen who attended the lectures and numerous requests were made for their continuance in another year.

The following is a summary of the subjects treated by the lectures:—

Dr. W. A. Clemens.—Pilchards—Members of the herring family—relationship of so-called sardines—the fishery and British Columbia's share in same—spawning—migrations as shown by tagging—methods of collecting tagged fish—changes in occurrence and possible causes. Fishes in the waters off the coast of British Columbia. Lantern slides of representatives of the main families with brief verbal notes on the importance, distribution and behaviour.

Dr. A. L. Tester.—Herring—The segregation of local populations—vertebrae counts—other measurements—tagging—apparatus—results to date—spawning—conservation.

Dr. N. M. Carter.—Bacteria—Their size and nature—environment favouring growth—rate of multiplication—effect on fish products—methods of combating—ice and its application—modified methods of storage—disinfection—general cleanliness. Insulation—Application of insulation to the conservation of ice. Dry rot—Nature and method of avoiding. Refrigerating agents other than ice—modified ices—eutectic ice—dry ice. Vitamin content of fish oils. Uses of fish viscera and other organs in the manufacture of pharmaceutical products. Preparation and testing of fish glues. Food values of salmon.

Mr J. P. Tully.—Currents—Gradient—origin and effect—wind—origin and effect—tides—effect—distribution off the west coast of Vancouver island—Difference between conditions with easterly and westerly winds—discussion of local conditions.

Dr. A. L. Pritchard.—Introduction—Role of fisheries research in the fishing industry—status of fisheries biologist—examples of problems solved—synopsis of lectures to be given in course. Salmon—Different species—age determination and age at maturity—efficiencies of the various methods of propagation—migration as shown by tagging programs—the effect of the power development on the Columbia river on our fisheries.

During the first morning, due to the fact that some of the individuals had some trouble reaching the scene of the lectures, the attendance amounted to only eight. Thereafter it varied from fifteen to a maximum of twenty-two on the day when the oceanography and the salmon life history were being discussed. The personnel of the audience changed but little throughout.

It was apparent from the number of questions and the discussion that the lectures were being appreciated. Probably because of the fact that the audience was selected, containing in the main the directors of the organization representing 225 trollers, this keen interest was apparent at all times. Many suggestions were advanced as to how such information might be presented to a larger body of fishermen more efficiently and easily.

APPENDIX No. 5

ANNUAL REPORT OF F. CHARNLEY, CHIEF CHEMIST, CANNED SALMON INSPECTION LABORATORY, VANCOUVER. B.C.

The general objectives of the system of inspecting and grading canned salmon introduced by the Canned Salmon Inspection Laboratory were outlined in the Annual Report for 1936-37. Since that time further data regarding important quality characteristics of British Columbia canned salmon have been accumulated, so that the laboratory is now in possession of complete data for the 1936 season together with the greater part of those for the 1937 season. These data enable accurate estimates of standard quality with respect to a given quality characteristic to be made. They thus furnish the industry with a reliable basis upon which to evaluate the quality of parcels of canned salmon examined by the laboratory.

QUALITY OF CANNED SALMON PACKED DURING 1936

Summaries of the distributions of various quality characteristics for the 1936 pack of British Columbia canned salmon are shown in tables I to V. In employing these results for comparative purposes certain points relative to the interpretation of the data should be noted. The more important of these are as follows:—

(1) The distributions refer to samples inspected between June 1, 1936, and May 31, 1937. This interval has been chosen because it very largely reduces overlapping of samples packed during the previous and immediately succeeding years. The data pertaining to this interval therefore represent accurately salmon packed during the 1936 season, since only in a very few instances are samples packed in adjacent years found within this interval. In this connection it may perhaps be of interest to point out that the present system of individual secret codes for recording packing dates on salmon tins very seriously impedes the accurate compilation of data relative to seasonal variation in quality. Conversely, a uniform, simple, two-letter or number code for this purpose would greatly expedite collection and publication of such data.

(2) A quality characteristic of a given manufactured product can only be accurately specified by means of a distribution function. When the distribution function is normal, that is, when it is symmetrical around the mean and fulfills certain other conditions, the quality characteristic can be specified by the arithmetic mean or average and the standard deviation. When the distribution is not of the normal type, it is necessary to employ other constants along with the mean and standard deviation in order to describe it. It is evident, therefore, that in discussing or setting up standards of quality, not only the average of the given quality characteristic, but also the standard deviation and, in some instances, other parameters of the distribution of the quality characteristic must be taken into consideration.

(3) The distributions summarized in tables I, II and III are distributions of single samples, while those summarized in tables IV and V are distributions of totals of samples of 12 tins. The mean or average of the distribution of averages of samples of size n will, of course, coincide with the average for the universe or distribution of single tins, but the standard deviation of averages of

samples of size n will be less than the standard deviation of the distribution of single tins. The problem of the correct interpretation of an average of a given sample size is too technical to discuss in this report. An approximate rule, however, which will be of value in comparing the results recorded on the Laboratory Report of Examination with those given in tables I to V is to consider deviations of $\pm 3S_n$ from the average for standard or some specified quality, where S_n is the standard deviation of averages of samples of size n . If the average of the sample of size n falls outside these limits, this may be taken as positive evidence that the sample in question has not been drawn from standard quality or the particular quality specified. This rule assumes that the variability in quality as measured by the standard deviation remains approximately constant. The need for distinguishing clearly between an average of a sample of a given size and a measure on a single tin is mentioned here because it is hoped that in future reports the data may be compressed still further by recording merely the mean, M , and standard deviation, S_n , of averages of some convenient sample size, say 12.

(4) For comparing variations in a quality characteristic in different species, relative variations should be employed, that is, the ratios S/M .

(5) The data reported in tables I to V are summaries of measurements on pooled samples. In the case of tables II, III, IV and V no attempt has been made to indicate the effects of seasonal and geographical factors. Similarly, the data given in table I represent composite populations in that they have been derived from samples packed by two distinct processes and by different canneries.

Data similar to those summarized in tables I to V have already been discussed in detail in a number of articles published by the Inspection Laboratory in the Progress Reports of the Biological Board of Canada (Fisheries Research Board). Hence it will only be necessary here to call attention to certain suggestive features of these data. The data of table I show clearly that, from the standpoint of vacuum, the one-quarter-pound flat and one-pound flat tins are not satisfactory salmon tins. In the case of each of these two can sizes the average vacuum obtainable with the present cannery processes of filling and exhausting is substantially less than that obtained when one-pound tall or one-half-pound flat cans are employed. Generally speaking, it seems safe to say that the vacuum in canned salmon packed in British Columbia could be still further improved. If it is not economically feasible to increase the average vacuum in the British Columbia product, then attention might profitably be directed towards reducing the large variability in this quality characteristic. Possible points of departure in attacking this problem readily suggest themselves. Attention might, for example, be directed towards controlling more carefully the net weight of the contents of the can, since it has been shown that the net weight is a predominating cause in the system of causes producing variation in vacuum. In the case of the exhaust box process a reduction in variation in vacuum might also be expected to follow more careful control of such factors as the rate, temperature and time of exhausting. Lastly, it might be worthwhile to direct attention to the can itself. Table VII shows that there is a rather surprising variation in the weights of the empty salmon tins themselves. A similar variation has been found by the inspection laboratory in the "springing" pressures of one-pound tall, one-half-pound flat and one-quarter-pound flat salmon tins. It seems reasonable to believe that a similar variation will also be found in the amount of inward deflection of the ends of the salmon tins used by the industry. Hence it is very probable that an appreciable proportion of the variation in vacuum arises from variations in the tins themselves.

Unlike the distributions of vacuum and colour, the distributions of softness given in table II are very definitely non-normal. In all instances the distributions possess a distinct positive skewness and are considerably more peaked than normal distributions. Distributions of averages of samples of 12, however, or of averages of sample sizes greater than 12, are very closely normal and may be considered normal for all practical purposes. As regards average softness, the various varieties of canned salmon listed in table II follow the order chum, sockeye and coho, blueback and pink, and spring, when arranged in ascending order of softness or descending order of firmness. The problem of a suitable scale for firmness or softness is discussed later in this report.

Table III shows that as regards the intensity of red colour in the flesh of the canned product the various species follow the order sockeye, blueback, coho, spring, pink and chum, when arranged in descending order of average red colour. As will be seen from the table, this is also the order of decreasing average yellow colour in these five species except in the case of chum and pink. In this instance the data show that the average intensity of the yellow colour in chum salmon is slightly greater than that for pink salmon. In this connection it might be mentioned that the average colours of the flesh of canned steelhead salmon are very similar to the corresponding averages for canned pink salmon, the steelhead salmon exhibiting slightly greater average intensities of colour than those for pink salmon.

The distributions summarized in tables IV and V refer to the total free aqueous liquor and free oil respectively occurring in samples of twelve tins. These distributions are approximately normal. An interesting feature of these data is the fact that canned sockeye salmon shows the smallest average volume of free aqueous liquor and, with the exception of spring salmon, the largest average volume of free oil for any of the species listed. Chum salmon lies at the other end of the series in possessing the largest average volume of free aqueous liquor and the smallest volume of free oil. Spring salmon has the largest average volume of free oil. A study of the variation in total free oil and free aqueous liquor of sockeye salmon packed during 1936 by canneries located on the Fraser river indicates that there is a pronounced seasonal variation in these two quality characteristics of canned sockeye salmon. These data have been discussed at some length in a Progress Report listed at the end of this report. From these data it appears that the choicest sockeye packed in this area during 1936 were packed in the interval extending from about July 15 to August 15. After August 15 the amount of free oil gradually decreased, this decrease being accompanied by a corresponding increase in the amount of free aqueous liquor. The samples packed after this date were also poor in firmness and red colour. In addition, a number of the samples showed "water-marks," that is, pink and orange discolorations on the skin, thus indicating that the salmon were far advanced in their spawning migration. These results show definitely that in setting up standards of quality for free oil and free aqueous liquor in canned salmon the industry should recognize clearly the importance of seasonal variations.

Owing to the necessity of selecting an interval that would reduce as far as possible overlapping of samples packed during adjacent years, data corresponding to those recorded in tables I to V have not yet been summarized for the 1937 season. It is of interest, however, to compare the freshness of samples of sockeye salmon packed during 1936 with those packed during the 1937 season and inspected between June 1, 1937, and December 31, 1937. These data are summarized in table VI. As will be seen from this table, the samples drawn from the 1937 pack contain no tainted tins and a surprisingly small number of stale and questionable tins. This pronounced improvement in freshness in the 1937 pack probably results from the operation of a number of factors, as, for example, the decrease in the 1937 pack relative to the 1936 pack and hence the

absence of any need for overtaxing the capacities of the canneries during 1937, a greater use of ice in handling the salmon, a more extensive application of disinfectants and cleansing agents to the equipment employed in handling the salmon, etc. In any event, these results indicate a gratifying improvement in quality of British Columbia canned salmon with respect to freshness and definitely prove that it is economically feasible to pack salmon of a high standard of quality as regards freshness.

The results summarized in table VII have already been mentioned with reference to the vacuum in canned salmon. In addition to their indirect bearing on vacuum, these results show the fluctuations in the net weight of the contents of the can that may reasonably be ascribed to variations in the weight of the can itself. For example, once in 370 times, in the long run, it may be expected that a one-pound tall salmon tin will deviate as much as 0.282 ounces from the mean weight of the one-pound tall tins, that is, 3.001 ounces, and once in 22 times, in the long run, such a can will vary 0.188 ounces from the mean weight of the one-pound tall tins. The bearing of these data on the problem of specifying tolerances for the net weight of the contents of the can is obviously of considerable importance, since it is hardly fair to hold the canner responsible for fluctuations in the net weight of the contents of the can which actually arise from variations in the weight of the can itself. It may be noted that while the number of tins examined in the case of each can size reported in table VII is not as large as could be desired, the averages and standard deviations represent closely the weights of the cans supplied to the industry during 1937 because these data were derived from pooled samples drawn at fairly regular intervals throughout the 1937 season.

TOLERANCES FOR FIRMNESS AND FRESHNESS

Tentative tolerances for the two main quality characteristics of canned salmon specified in the regulations, namely, firmness and freshness, were established early in 1937 by a committee assigned to investigate this problem. This committee consisted of Messrs. S. M. Rosenberg, Nootka Packing Company; S. Humphreys, Colonial Packers Limited; H. R. Beard, Canadian Fishing Company, and F. Charnley. After a careful study of the 1936 data, the texture or softness standards shown in table VIII were decided upon. In the case of freshness, the laboratory proposed the sampling scale and the examiner's rules for rejection and approval shown in table IX. Owing to the substantial increase in the number of samples required by this scale, however, the industry felt unwilling to recommend the proposed scale unless some provision could be made for reimbursing the salmon canner for the increased withdrawals of samples from parcels submitted for examination. The examiner's rules of rejection and approval for freshness, on the other hand, were considered reasonably satisfactory and for this reason have been, and are still being applied by the laboratory in passing on the freshness of parcels of canned salmon. The scale of first samples provided for in the proposed sampling scale for the 1937 season has, of course, been replaced by the sampling scale provided by the regulations.

The problem of specifying tolerances for the various grades of canned salmon leads the investigator into a highly technical field and hence cannot be discussed in detail here. It may be of value, however, to sketch very briefly the nature of the questions involved. These may be illustrated by reference to figures 1 and 2, which are reproduced from a bulletin in preparation at the inspection laboratory dealing with the estimation of percentages of defective tins in parcels of canned salmon. These figures show graphically the probabilities involved in sampling from parcels of varying fraction defective (stale or tainted tins) and are applicable to parcels consisting of 20 or more cases of

48 one-pound tall salmon tins. Figure 1 refers to a sample of 12 cans, figure 2 to a sample of 36. From figure 1 it will be observed that the chances of drawing zero defective tins in a sample of 12 drawn from a parcel containing 20 per cent defective tins ($p=0.20$) are about 7 in 100. Similarly, the chances of drawing zero or 1 defective tin in a sample of 12 drawn from such a parcel are approximately 27 in 100. Hence, if the parcel is rejected every time one defective tin appears in the sample, only about 7 parcels out of every 100 of such parcels submitted for examination will, in the long run, be passed by the examiner. The consumer's risk of receiving such parcels is, therefore, $P_c=0.07$ corresponding to a consumer's effective level $p=0.20$. Parcels of worse quality than $p=0.20$ will be rejected with increasing frequency. As the quality improves, that is, as p decreases, parcels submitted for examination will be approved with greater frequency, until eventually, when the quality is $p=0.001$, approximately 99 per cent of such parcels will be approved.

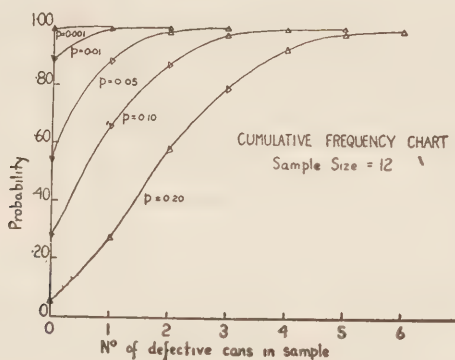


Fig. 1.—Cumulative frequency distributions for samples of 12 drawn from parcels of varying fraction defective.

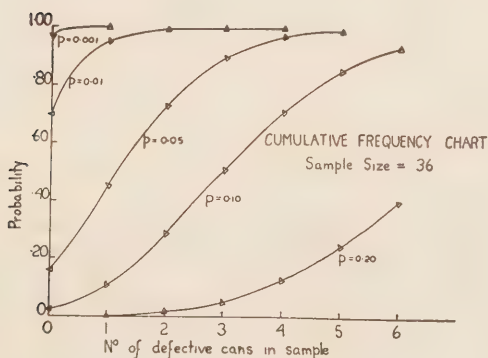


Fig. 2.—Cumulative frequency distributions for samples of 36 drawn from parcels of varying fraction defective

The producer's risk corresponding to a producer's effective level of $p=0.001$ is, therefore, $P_p=1-0.99=0.01$. As will be easily evident from a study of figure 2, the effect of increasing the sample size is to reduce the belt of uncertainty between the producer's and consumer's effective levels corresponding to given risks. In the case of a sample size of 36, the consumer's effective

level corresponding to the consumer's risk $P_c = 0.023$ has been raised to $p = 0.10$, thus very materially improving the quality of the parcels which the consumer will be called upon to accept. It is true, the producer's risk corresponding to the effective level $p = 0.001$ has been slightly increased, but this could be very readily adjusted by making provision for withdrawal of a second sample, or by altering the examiner's rule of rejection.

From the foregoing it will be apparent that the specification of tolerances for a given quality characteristic of an industrial product, which consists of a large number of similar units, involves the specification of the sample size and the consumer's and producer's risks and effective levels. In the case of a normally distributed characteristic, the average quality and the variation in quality can be readily specified in terms of a co-efficient of variation. Cumulative sampling distributions for a simple statistic of this nature proposed by E. S. Pearson enable appropriate consumer's and producer's effective levels and risks corresponding to certain sample sizes to be specified. In the case of the softness standards given in table VIII the complexity of the problem is greatly enhanced by the fact that the distributions vary widely from the normal. The statistic, fraction p of tins showing a softness of z or greater, serves in a sense to specify variation in quality, but it is not theoretically as satisfactory as the method of combining the average and standard deviation, or some other measure of variation, into a co-efficient variation. Furthermore, the result of applying these limits to various sample sizes will result in fluctuations in the consumer's and producer's effective levels corresponding to given risks.

The tolerances for softness given in table VIII are thus not all that could be desired theoretically. From a practical standpoint, however, they appear to have given quite satisfactory results during the past year. On a basis of these tolerances, the percentages of parcels and cases of one-half-pound flat sockeye salmon packed during the 1936 season and in 1937 up to December 31 that were of grade B quality on account of softness are as follows:—

	1936		1937	
	Cases	Parcels	Cases	Parcels
Total.....	295,074	427	247,673	345
Grade B (Softness).....	4,599	32	none	none
Percentage.....	1.56	7.49		

These figures point to a definite annual variation in this quality characteristic of canned sockeye salmon.

In addition to their use for grading purposes, further research may reveal the possibility of employing penetration tests for firmness for grading salmon on a basis of this quality characteristic at the time of filling, if, as seems probable, a correlation should be found to exist between the softness of the raw and cooked samples. This possibility seems well worth investigating, since such a relationship would furnish the industry with a means of greatly reducing the number of parcels that are found to require double capping through their failure to obtain grade A rating for softness.

RESEARCH PROBLEMS

As mentioned in last year's Annual Report, an investigation of the problem of measuring softness, or firmness, of canned salmon has suggested a tentative scale for this quality characteristic which largely eliminates the skewness

occurring in distributions expressed in the old scale, so that distributions expressed in the new scale may, for all practical purposes, be considered normal. The mechanics of the penetration process are being further investigated with a view to obtaining some fundamentally sound measure of the resistance to penetration exerted by the sample. This resistive effect of the sample depends upon the velocity, as well as the depth of penetration, a fact which does not appear to have been clearly recognized hitherto by those employing penetration tests for measuring firmness or consistency.

A further investigation of the relationship between the PH of the aqueous liquor in canned salmon and the examiner's ratings for odour has shown that, in the case of chum salmon, there is a fairly high correlation between the PH of the aqueous liquor and the examiner's ratings for odour. From an examination of 141 cans of chum salmon sampled at various times throughout the season the correlation between PH and the examiner's ratings for odour was found to be 0.55. A further study of these data, however, indicates that this correlation is mainly a seasonal effect. From the standpoint of odour the problem of incipient deterioration, therefore, appears to involve three main factors, namely, bacterial, enzymatical and chemical, and biological effects.

Preliminary tests with the trimethylamine test developed by the Atlantic Fisheries Experimental Station, Halifax, N.S., have not been particularly encouraging owing to the apparent lack of a definite correlation between the examiner's ratings for freshness and the trimethylamine value. A further investigation of this test, however, will be necessary before final conclusions can be drawn regarding its value in determining lack of freshness in canned salmon. Meanwhile, the laboratory is investigating the method of detecting incipient deterioration in canned salmon proposed some years ago by the Pacific Fisheries Experimental Station, Prince Rupert, B.C. This latter method employs the acid value of the oil as a measure of incipient deterioration. During the past season the laboratory has developed a rapid method of determining acid values of fish oils depending on the fact that in dilute aqueous solutions a small increase in concentration of fish-oil soap produces a pronounced lowering of surface tension. Preliminary experiments with this test, however, have so far failed to reveal any significant correlation between acid value (lowering of surface tension) and the examiner's ratings for freshness on a basis of odour. On the other hand, these experiments furnish valuable information regarding the problem of incipient deterioration, in that they reveal more clearly the nature of the factors influencing subjective estimates of freshness. For example, these preliminary data show that there is a significant correlation between the acid value of the oil and the PH of the aqueous liquor in canned salmon, when the effects of seasonal and geographical factors are eliminated, thus indicating that there is a concomitant relationship between these two characteristics, and that the system of causes underlying variation in one characteristic is closely allied to the system causing variation in the second, but that it is essential that seasonal and geographical effects be taken into account. Finally, in this connection, it should, perhaps, be pointed out that the condition that must be fulfilled by any proposed test for detecting and measuring incipient deterioration in canned salmon or other canned fish products is that the test must show a reasonably high correlation with an experienced examiner's subjective ratings on a basis of odour and other evidence of incipient deterioration. If the proposed test fails to fulfill this condition, it is difficult to see how the industry can be reasonably asked to accept such a test as a measure of incipient deterioration.

PUBLICATIONS

The following publications give detailed accounts of certain of the investigations referred to above that have been carried out at the inspection laboratory during 1937.

Goard, D. H. and F. Charnley—Vacuum in Canned Salmon.

Prog. Rep. Pac. Fish. Expl. Stn. 32.

Bolton, R. S. and F. Charnley—The Free Aqueous Liquor in Canned Salmon.

Prog. Rep. Pac. Fish. Expl. Stn. 33.

TABLE I.—SUMMARY OF VACUUM MEASUREMENTS ON SAMPLES OF CANNED SOCKEYE SALMON INSPECTED BETWEEN JUNE 1, 1936, AND MAY 31, 1937

	1-lb. talls	$\frac{1}{2}$ -lb. flats	1-lb. flats	$\frac{1}{4}$ -lb. flats
No. of cans examined.....	2,617	7,405	562	547
Average vacuum (inches).....	9.79	8.29	5.72	5.07
Standard deviation (inches).....	3.14	3.47	2.70	3.64
Standard deviation of average of 12 cans.....	0.91	1.00	0.78	1.05
Range.....	pos. press. to 22 in.	pos. press. to 20 in.	pos. press. to 14 in.	pos. press. to 15 in.
Percentiles (inches):				
25%.....	7.82	6.02	4.35	2.21
50%.....	9.83	8.23	5.83	5.10
75%.....	11.94	10.65	7.21	7.51

Vacuum is expressed in inches of mercury. Atmospheric pressure at sea level = 29.9 inches of mercury.

TABLE II.—SUMMARY OF DISTRIBUTIONS OF SOFTNESS (TEXTURE) OF SAMPLES OF CANNED SALMON DRAWN FROM PARCELS INSPECTED BETWEEN JUNE 1, 1936, AND MAY 31, 1937.

ONE-POUND TALLS

	Sockeye	Blueback	Coho	Spring	Pink	Chum
		(x)				
N.....	2,597	872	3,135	1,171	5,848	8,455
M.....	8.82	9.32	8.67	10.80	9.07	7.86
S.....	2.06	1.69	1.72	3.54	1.86	1.49
S ₁₂	0.59	0.49	0.50	1.02	0.54	0.43
R.....	5-22	5-20	5-22	5-38	5-25	4-22
Percentiles:						
25%.....	7.36	8.12	7.50	8.51	7.77	6.81
50%.....	8.46	9.13	8.42	10.07	8.84	7.66
75%.....	9.90	10.30	9.57	12.15	10.08	8.66

ONE-HALF POUND FLATS

		(x)				
N.....	7,951	1,246	4,245	1,700	2,905	1,954
M.....	9.15	10.07	9.59	11.66	10.25	8.86
S.....	2.01	1.77	1.94	3.31	2.15	2.00
S ₁₂	0.53	0.51	0.56	0.96	0.62	0.53
R.....	4-25	6-18	5-27	5-30	5-24	5-21
Percentiles:						
25%.....	7.77	8.81	8.16	9.35	8.74	7.42
50%.....	8.89	9.87	9.37	11.00	9.95	8.50
75%.....	10.19	11.20	10.72	13.32	11.42	9.98

N = Total number of tins examined; M = Average softness (arithmetic mean) in scale units; S = Standard deviation of distribution of single tins; S₁₂ = Standard deviation of average of 12 tins; R = Range in scale units; (x) = Immature Coho.

TABLE III.—SUMMARY OF DISTRIBUTIONS OF COLOUR OF SAMPLES OF CANNED SALMON DRAWN FROM PARCELS INSPECTED BETWEEN JUNE 1, 1936, AND MAY 31, 1937.

RED

	Sockeye	Blueback	Coho	Spring	Pink	Chum
N.....	2,620	413	1,876	664	2,767	3,035
M.....	6.61	6.00	4.95	4.25	3.13	2.61
S.....	0.94	0.65	0.66	1.51	0.52	0.57
S _s	0.38	0.27	0.27	0.62	0.21	0.23
R.....	2.5-10.0	4.5-8.0	2.5-8.0	1.0-8.0	1.5-5.0	1.0-4.5
Percentiles:						
25%.....	6.00	5.52	4.54	3.16	2.79	2.20
50%.....	6.57	5.97	4.96	4.60	3.11	2.62
75%.....	7.20	6.41	5.33	5.35	3.50	3.03

YELLOW

	Sockeye	Blueback	Coho	Spring	Pink	Chum
N.....	2,620	413	1,876	664	2,767	3,035
M.....	4.18	3.50	3.33	3.18	2.71	2.81
S.....	0.69	0.54	0.49	0.71	0.36	0.42
S _s	0.28	0.22	0.20	0.29	0.15	0.17
R.....	2.0-7.0	2.0-5.0	2.0-5.0	2.0-5.5	1.5-4.5	2.0-5.5
Percentiles:						
25%.....	3.70	3.08	2.96	2.62	2.43	2.49
50%.....	4.24	3.47	3.29	3.11	2.68	2.80
75%.....	4.64	3.89	3.66	3.68	3.00	3.10

N=Total number of cans examined; M=Average colour (arithmetic mean) in Lovibond colour units;
 S=Standard deviation of distribution of single cans; S_s=Standard deviation of average of 6 cans;
 R=Range in Lovibond colour units.

TABLE IV.—SUMMARY OF DISTRIBUTIONS OF TOTAL FREE AQUEOUS LIQUOR IN SAMPLES OF 12 CANS DRAWN FROM PARCELS OF CANNED SALMON INSPECTED BETWEEN JUNE 1, 1936, AND MAY 31, 1937.

ONE-POUND TALLS

	Sockeye	Blueback	Coho	Spring	Pink	Chum
N.....	219	56	298	82	892	1,179
M.....	827.7	973.6	887.9	879.2	989.3	1,040.0
S ₁₂	126.1	56.7	84.2	138.7	96.4	119.7
R.....	502-1,202	832-1,132	602-1,232	522-1,172	552-1,392	627-1,627
Percentiles:						
25%.....	734.6	936.1	838.1	797.5	927.8	961.3
50%.....	830.4	972.5	889.6	889.2	989.4	1,026.2
75%.....	917.6	1,019.2	942.9	964.2	1,053.2	1,108.3

ONE-HALF POUND FLATS

	Sockeye	Blueback	Coho	Spring	Pink	Chum
N.....	788	98	398	110	336	190
M.....	396.4	467.7	443.1	413.9	473.0	511.4
S ₁₂	56.4	40.0	46.5	62.8	49.7	64.9
R.....	152-652	347-572	282-602	227-602	282-642	277-802
Percentiles:						
25%.....	363.5	443.1	411.6	372.0	441.7	470.0
50%.....	395.0	470.7	443.8	415.0	472.0	510.2
75%.....	427.2	496.8	472.0	455.6	505.9	549.2

N=Number of samples of 12 examined; M=Average volume of free aqueous liquor in 12 cans (c.c.); S₁₂=Standard deviation of free aqueous liquor in 12 cans; R=Range in volume of free aqueous liquor in 12 cans (c.c.); 16.4 c.c. (cubic centimeters)=1 cubic inch.

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TABLE V.—SUMMARY OF DISTRIBUTIONS OF TOTAL FREE OIL IN SAMPLES OF 12 CANS DRAWN FROM PARCELS OF CANNED SALMON INSPECTED BETWEEN JUNE 1, 1936, AND MAY 31, 1937.

ONE-POUND TALLS

	Sockeye	Blueback	Coho	Spring	Pink	Chum
N.....	219	55	298	82	892	1179
M.....	84.8	26.3	39.7	97.0	28.6	8.0
S ₁₂	45.7	11.5	22.6	64.3	15.1	6.9
R.....	2.5-242.5	7.5-62.5	2.5-132.5	7.5-327.5	0-107.5	0-92.5
Percentiles:						
25%.....	49.2	18.6	23.1	45.7	17.2	3.2
50%.....	79.4	24.5	37.0	81.5	27.3	6.9
75%.....	114.7	32.7	51.3	134.6	37.9	10.9

ONE-HALF POUND FLATS

	Sockeye	Blueback	Coho	Spring	Pink	Chum
N.....	788	98	398	110	336	190
M.....	50.9	13.6	22.6	57.9	18.4	7.1
S ₁₂	24.3	5.7	13.4	31.1	11.5	5.1
R.....	0-157.5	2.5-32.5	0-77.5	7.5-137.5	0-92.5	0-52.5
Percentiles:						
25%.....	32.3	9.3	13.1	30.5	10.7	3.6
50%.....	49.5	12.4	20.2	53.9	16.2	6.7
75%.....	66.4	17.2	29.8	84.0	22.4	9.9

N = Number of samples of 12 examined; M = Average volume of free oil in 12 cans (c.c.); S₁₂ = Standard deviation of free oil in 12 cans; R = Range in volume of free oil in 12 cans (c.c.); 16.4 c.c. (cubic centimeters) = 1 cubic inch.

TABLE VI.—COMPARISON OF FRESHNESS OF SAMPLES OF SOCKEYE SALMON PACKED DURING 1936 AND 1937 SEASONS

	1936	1937 (x)
Approximate No. of cases represented by samples.....	367,600	271,800
No. of tins examined.....	13,922	9,446
No. of questionable tins.....	307	32
No. of stale tins.....	179	5
No. of tainted tins.....	10	none
Percentage questionable tins.....	2.21	0.339
Percentage stale tins.....	1.29	0.053
Percentage tainted tins.....	0.072	.....

(x) These samples were drawn from parcels inspected between June 1, 1937, and December 31, 1937.

TABLE VII.—SUMMARY OF DISTRIBUTIONS OF WEIGHT OF EMPTY SALMON TINS BASED ON DATA COLLECTED DURING 1937 SEASON

Size of Tin	No. of Tins Examined	M (oz.)	S (oz.)	Range, 6S (oz.)
1-lb. Tall.....	213	3.001	0.094	2.719-3.283
$\frac{3}{4}$ -lb. Flat (x).....	204	2.198	0.082	1.952-2.444
$\frac{1}{2}$ -lb. Flat.....	156	1.584	0.044	1.452-1.716

(x) Reduced Size; M = Arithmetic Average; S = Standard Deviation.

TABLE VIII.—TEXTURE OR SOFTNESS STANDARDS FOR 1937 SEASON

Species	Size of Can	Grade A limit of sample average X for all sample sizes	Grade A limit of fraction p of tins showing softness of Z or greater for all sample sizes		Number of cans in sample showing softness of z or greater	
					Sample Size 12	Sample Size 24
		X	p	z		
Sockeye.....	1 lb. Tall...	11.0	0.25	13	3	6
	$\frac{1}{2}$ lb. Flat...	11.0	0.25	13	3	6
Blueback.....	1 lb. Tall...	10.5	0.15	13	2	4
	$\frac{1}{2}$ lb. Flat...	11.5	0.30	13	4	8
Coho.....	1 lb. Tall...	10.5	0.15	13	2	4
	$\frac{1}{2}$ lb. Flat...	11.5	0.30	13	4	8
Spring.....	1 lb. Tall...	14.0	0.30	16	4	8
	$\frac{1}{2}$ lb. Flat...	14.5	0.40	16	5	10
Pink.....	1 lb. Tall...	11.00	0.25	13	3	6
	$\frac{1}{2}$ lb. Flat...	12.00	0.40	13	5	10
Chum.....	1 lb. Tall...	10.00	0.25	13	3	6
	$\frac{1}{2}$ lb. Flat...	11.00	0.25	13	3	6

The parcel will not be graded B unless both the average (X) and the fraction defective (p) equal or exceed these limits. Until further data are available, 1-pound flat tins will be graded as $\frac{1}{2}$ -pound flat tins. The limits X and z for $\frac{1}{2}$ -pound flat tins will be respectively 1 unit greater than the corresponding limits for 1-pound flat tins.

TABLE IX.—PROPOSED SAMPLING SCALE FOR 1937 SEASON AND EXAMINER'S RULES OF REJECTION AND APPROVAL FOR FRESHNESS

SAMPLING SCALE FOR 1937 SEASON

No. of Cases in Parcel (48 cans per case)	No. of Cans in Sample		
	First Sample	Resample	Total Sample
1.....	6	12	18
2 to 5.....	12	12	24
6 to 20.....	18	24	48
21 to 1,000.....	36	60	96
1,001 up.....	48	48	96

EXAMINER'S RULES OF REJECTION AND APPROVAL FOR FRESHNESS

Rule I. If no stale or tainted tins are found in the first sample, the examiner will pass the parcel as grade A with respect to freshness. Questionable tins will not be considered for grading purposes.

Rule II. If one or more stale or tainted tins are found in the first sample, the examiner will resample the parcel according to the foregoing sampling scale. The parcel will then be graded with respect to freshness on the basis of the total sample thus obtained in accordance with the following scale:—

Rule II	No. of Tainted Tins in Total Sample	No. of Stale Tins in Total Sample	Grade
(a).....	0	1 to 3 (inclusive)...	A
(b).....	0	4 or greater.....	B
(c).....	1	0.....	A
(d).....	1	1.....	B
(e).....	1	2 or greater.....	Condemned
(f).....	2	Zero or any number	Condemned

APPENDIX No. 6

ENGINEERING BRANCH

REPORT BY CHARLES BRUCE, A.M.E.I.C., FISHERIES ENGINEER

Works of a technical nature undertaken by the department in the Maritime Provinces and in British Columbia come under the responsibility of the Engineering Branch and, in addition, the branch undertakes assistance and co-operation with fish and game associations by advice, surveys and designs for the establishment by them of rearing ponds and hatcheries and in stream improvement; the design and supervision of the construction of bait freezers built by fishermen's associations or others; the design and supervision of the construction of fishways, which may be installed by the owners of the dams in which they are required, and the supervision of the leasing of areas for oyster farming.

In many instances where obstructions to the ascent of fish occur in smaller streams, due principally to accumulations of debris, trees, etc., which are brought down by freshets, the usual practice is to require the local fisheries inspectors to investigate the conditions and unless they are such as to require the advice of an engineer, the necessary removals are carried out under the inspectors' supervision.

All work coming under branch in British Columbia is undertaken under the direct supervision of Resident Engineer John McHugh, with headquarters at Vancouver.

The principal works undertaken during the year are classified and reviewed hereunder.

BUILDING FISHWAYS AND CLEARING RIVERS

NOVA SCOTIA

No abnormal obstructions in Nova Scotia streams required attention during the year but smaller obstructions in the way of river drift, and debris which had accumulated during the spring freshets in such a manner as to prevent the ascent of fish to suitable spawning grounds, were removed from the following rivers and streams: Brocks brook, Salmon river, and Mill brook in Cape Breton county, McFadyen's brook, Alder brook, Long Point river and McLeod's brook in Inverness county.

The estuary of Trout brook into lake Ainslie, Inverness county, is subject to blocking by sand and gravel bars which prevent the access of trout seeking that stream in large numbers. The condition was unusual during the year as the stream had divided into two small runs neither of which afforded a passage for fish, and it was necessary to do considerably more work than is usually required to afford a suitable channel.

Somewhat similar work was done at the outlets of McInnis and Grass Cove ponds, Inverness county, to provide a passage for the descent of alewives.

The Shubenacadie river, Hants county, had become so low and obstructed with heavy growths of grass during the summer that it was necessary to clear channels to provide for the descent of young alewives which were being destroyed in immense numbers by eels.

A channel was opened up through a rock-strewn portion of the bed of Petite riviere, Lunenburg county, where except during the higher stages of water, salmon were unable to ascend.

Certain repairs were made to a stone and concrete wall in the Tusket river, Yarmouth county, which had been erected for the purpose of concentrating the flow of water in the river to assist the ascent of salmon.

The usual attention was given to the provision of screens in the Round Hill and Lequille rivers in Annapolis county and in the Clyde river, Shelburne county, where they are maintained each year to prevent fish from entering channels from which they would be unable to ascend the streams.

During the previous year the Nova Scotia Light and Power Company completed a diversion of the Gasperau river, King's county, by which the water is taken through a system of canals from Gasperau lake and returned to the main river several miles lower down through a power development. The effects of this diversion, which have resulted in practically drying up the main river between the foot of the lake and the point where the water is returned to the main river, except during periods of high water, were studied by an engineer of the department in company with a fish cultural official and a scientist of the Fisheries Research Board, with a view to determining what could best be done to conserve the fishery of the river. Reports from the various standpoints are receiving consideration.

Inspections by an engineer were made of situations in connection with the ascent of fish at dams on Nine Mile river, Osier river, Terrence Bay brook, Fletcher's lock, Portobello lock, Little Salmon river, Minesville river and Tangier river, all in Halifax county, and information was secured, where this was deemed necessary, for the designs of fishways or for the improvement of existing means for the ascent of fish.

During the year the Nova Scotia Power Commission commenced construction of a large power development on the Mersey river, Queens county, at Cowie falls, and designs for a fishway to be installed in the dam at this development were prepared by the Engineering Branch of the department.

The Halifax Fish and Game Association sought advice regarding the installation of a screen to prevent the descent of fish from lake Charles on the Darmouth lake system, and information to enable them to proceed was afforded.

NEW BRUNSWICK

Some small repairs were made to the concrete walls of the fishway over the falls at the mouth of the Magaguadavic river, where damage had been caused by the previous winter conditions.

At Flume ridge, on the same river, an inspection was made by an engineer and directions given to the owner of the dam there for the installation of a fishway, plans for which had previously been prepared. This fishway was subsequently completed and proved efficient for the ascent of salmon.

An engineer of the department collaborated with one from the State of Maine Department of Game and Fisheries in an investigation of the dams on the St. Croix river for the purpose of determining if it would be practicable to have adequate fishways provided for the ascent of salmon.

PRINCE EDWARD ISLAND

The fishway in the dam on the Vernon river, Queens county, was entirely rebuilt, the existing structure having so deteriorated that repairs were not practicable. This fishway affords a means of ascent for numbers of sea trout.

BRITISH COLUMBIA

The removal of obstructions to the ascent of salmon, which remains one of the major duties of the branch in this province has been well taken care of during the past several years and though of late certain lesser obstructions dealt with have not required the close supervision of an engineer provided in

previous years, due to the local inspectors having, from experience, become well acquainted with what is required, major works still continue to require engineering supervision.

Maggie River.—The principal work performed during 1937 under this heading was the breaking down of a waterfall and the construction of a fish ladder through the opening thus made in the rock at Maggie River falls located on the west coast of Vancouver island near the entrance to Barclay sound.

Maggie lake, which lies at the head of this stream, was examined some years ago by officers of the Fish Culture Branch, and found to contain what were considered to be suitable areas of spawning ground which were not available for use by salmon because of the obstruction formed by the falls. Plantings of sockeye salmon eggs were made on these spawning beds over a cycle of years and in view of the expected return of adult salmon preparations were made to open up the falls to permit of their ascent for natural spawning. The work consisted of blasting a cut through the fall and constructing a series of seven pools of varying size and depth separated from each other by reinforced concrete walls. There were several delays in the work because of inclement weather and floods and the concrete walls were only just completed before the fall rains commenced after which further work that year became impossible. The job cannot be properly completed until the coming summer months when the matter of water regulation through the ladder will receive attention. This area is subject to very heavy floods and the question of proper regulation of flow through the fish ladder during salmon runs will require very careful consideration and treatment.

Koeye River (Bella Bella District).—An interesting work carried out during the year was the construction of a barrier consisting of a log crib eight feet wide, five feet high and 100 feet long at the foot of the falls in Koeye river, the whole filled with angular rock, for the purpose of diverting the runs of both sockeye and pink salmon away from the heavy overfall over a high sheer rock ledge located in a portion of the bed of Koeye about six miles from its mouth. The river at this point has considerable width and the remainder of the stream in this cross section flows down in a series of cataracts which are passable by salmon. Numbers of salmon, having reached the foot of the overfall, instead of proceeding farther up stream by the easier passage have remained in the extensive deep pool at the base of the overfall and gradually become exhausted through frequent vain attempts to climb the fall. This has resulted, in past years, in the loss of eggs which it was felt could be saved by the construction outlined above, making it impossible for the fish to reach this pool and directing them instead to the easier section of the stream whereby their access to the spawning grounds on Koeye lake would be assured. The job was unique in the fact that, for the first time on similar work by this department, both men, tools, equipment, explosives and food supplies were taken into the work by aeroplane. The only other access to Koeye lake is by means of a very rough and narrow trail requiring at least three hours to travel on foot from the river mouth to the lake travelling light. It would have required several days of exhausting work to transfer all the material required to the job and much time and expense was saved by using the aeroplane, which made the trip in a few minutes.

Nanaimo River.—The falls in Nanaimo river which have on occasions been the cause of delay to ascending salmon proved to be an absolute block during the summer of 1937. Run off in the river was reduced to a very low volume during the late summer and adult sockeye salmon, considered to be returns from egg plantings in the lake during previous years were, in the opinion of local officers, being definitely held up. An old, dry channel in the stream bed was cleaned out and a stream diverted into it from the river. Two pools were excavated in the ledge rock where the new channel joined the main stream. As a result of the work, the sockeye proceeded upstream without further delay.

Minor obstructions, consisting generally of logs and roots, beaver dams and low rock falls, were removed from the beds of the following streams under direction of the local inspector in whose districts they were located. Results in every case were satisfactory and salmon were enabled to reach their spawning grounds: Chemainus river, Salmon river, Atnarko river, Chicken creek, French creek, Sucker creek, Rosewall creek, Tuna river, Kis-suc-sus creek, Gates creek, Sally river, Knox Bay creek, Yakoun river, Blood creek.

Fish Ladders.—Two fish ladders were installed during the year, one at the foot of Trout lake, Upper Puntledge river and one at Miller creek, a tributary of the Cheakamou river. Both these ladders were of similar design prepared by the Engineering Branch, built of timber, each having a lift under ten feet, and both were installed in timber dams, the cost in each case being defrayed by the owners of the dams. Both ladders have proved to be satisfactory in operation, according to reports furnished by local officers.

Wau-Quash River, Owekano Lake.—An inspection was made by an engineer of conditions on this river which drains into the head of Owekano lake, Rivers inlet. The stream, because of low lying banks of soft material, has broken away from its bed about three-quarters of a mile above its mouth and jointed another stream, leaving the lower end below the diversion practically dry. Unfortunately, it is in these lower reaches that most of the spawning grounds lie and as a result of the diversion the seeding of the stream was poor in the 1937 season. Access to this place is difficult since the abandonment of the Rivers Inlet hatchery, as no suitable boat is now available on the lake. These difficulties, together with the uncertainty regarding the permanency of any work to restore the river to its original channel, except at what may prove an excessive cost, have led the department to conclude that the situation should not receive attention at the present time. Due to the nature of the country, it is quite within the bounds of possibility that the river may again become restored to its old channel through natural agencies.

FISH CULTURAL ESTABLISHMENTS

Repairs and replacements at hatchery establishments were attended to as usual during the year and the following works were undertaken:—

Antigonish Hatchery.—The concrete walls of six rearing ponds, each 115 feet long, were repaired where they had eroded from winter conditions and two steel rails were placed across the series of twelve ponds to provide support, these replacing the iron rods previously used for that purpose.

Cobequid Hatchery.—The circular ponds built during the previous year at this hatchery, while operating in a satisfactory manner, gave considerable trouble from leakage into the subsoil. The clay with which they had been lined proved to be of rather poor quality for the purpose and, while various attempts were made to overcome this with gravel and sand packing, it became evident that in several of the ponds something of a more permanent nature would be necessary. As an experiment the clay was removed from two ponds and one was then lined with concrete and the other with asphalt. Experience has shown that the latter is likely to prove more satisfactory under the severe winter conditions that obtain. Further experimental work is contemplated next year. A pneumatic pumping system was installed in the basement of the dwelling to provide a domestic water supply, power being available from the electric lighting system provided during the previous year.

Grand Lake Rearing Ponds.—Six circular ponds, each 25 feet in diameter, were constructed on the site during the year. The water supply is provided by a 10-inch wood stave pipe extending approximately 210 feet from the water supply dam. Designs for the ponds were prepared by the Engineering Branch and the construction was under its supervision.

Kejimikujik Lake Ponds.—A wire fencing, so erected as to prevent access of mink, was erected around the system of rearing ponds at this station. In order to determine the acreage of lands that it would be necessary to acquire for flowage around Grafton lake, from which the water supply for this pond system is taken, it was necessary to run a traverse survey entirely around it, a distance of more than seven miles, from which the flowage line and acreage were established.

Yarmouth Hatchery.—A number of casement windows in the hatchery dwelling, which had given trouble from leakage during driving rains, were removed and replaced by sliding sashes.

Lindloff Hatchery.—The design for circular rearing ponds at this hatchery, prepared several years ago, provided for a total of eight ponds in the space available. While the necessary flume for the whole system had been built only four ponds were completed. As these had proved satisfactory the remaining four were constructed during the summer. The embankment forming the dam at the foot of Lindloff lake, from which this establishment takes its water supply, was found to be in poor condition and it was necessary to renew the plank facing and gate, and make some repairs to the flume where it enters the lake.

Margaree Hatchery.—The old dwelling at this hatchery was poorly constructed and was so located on low lying ground that no basement accommodation could be provided. It was accordingly decided to erect a new dwelling at a more suitable location. The building is bungalow type measuring thirty feet square, with full basement, and provides living room, dining room, kitchen, bath room and one bedroom on the ground floor, and three bedrooms on the second floor. A verandah extends across the front and a summer kitchen is provided at the rear. The building is wired for electric lighting and a pneumatic water system is provided for the domestic supply. The usual plumbing fixtures are provided in the bathroom and kitchen.

Five circular ponds each 25 feet in diameter, designs for which had been provided during the previous year and construction of which had been commenced, were completed. The water supply is provided by a 12-inch wood stave pipe approximately eleven hundred feet long, extending from a newly constructed intake on the hatchery brook. Certain improvements consisting of a box flume and sluices were laid to the series of natural rearing ponds on the hatchery property and the breakwater at the intake of this pond system was repaired and extended to prevent freshets from flowing over the ponds.

Coldbrook Rearing Ponds.—Surveys for a system of rearing ponds at Coldbrook, Kings county, had been made during the previous year and from this information plans for this development were prepared, providing for sixteen circular ponds each 25 feet in diameter. Following the decision to proceed with the work it was necessary first to complete surveys for the land to be acquired and after this was secured construction was proceeded with under the supervision of an engineer. The water supply was provided by rebuilding the timber portion of an old dam, but examination of the earth embankments revealed that it would be necessary to provide a cove well throughout to make them water tight. To reach suitable foundations it was necessary to trench to depths as much as 14 feet before a satisfactory job was completed. The water supply to the ponds is through a twelve-inch wood stave pipe approximately 600 feet long with 2½-inch branch pipes to feed each pond separately. Each pond is fitted with a concrete slab eight feet in diameter in the centre of the bottom and from the centre of this slab a drain pipe extends down to a box drain under the pond bottoms running to one main outlet and discharging into the brook. A standpipe erected in the center drain of each pond serves to keep the water to the

desired level and vertical screens erected in a framework around this drain prevent the escape of young fish. All ponds were lined with heavy clay to prevent leakage and then with gravel and sand.

A bungalow for the superintendent, measuring 21 feet by 28 feet 2 inches, was built, providing a living-room, kitchen and two bedrooms, the whole being wired for electric lighting.

A second building, 21 feet by 39 feet, provides a garage with work-room space, icehouse, feed room and cold storage room, with storage space for equipment on the second floor. The cold storage room measures 7 feet 6 inches by 8 feet, insulated with six inches of corkboard. Galvanized iron retorts are fitted overhead to provide for ice and salt refrigeration. A small galvanized iron box inserted in one wall of the storage room provides space for holding prepared fish food, and a suitable grinder for preparing food is installed in the feed room.

NEW BRUNSWICK.

Florenceville Hatchery.—An auxiliary hatchery, started during the previous year, was completed. It serves to relieve congestion in the main hatchery during the hatching period and thereafter during the season for rearing purposes. The acquisition of a new and larger truck made it necessary to consider either enlarging the garage or building a new one. As storage space for equipment was needed at this establishment it was decided to utilize the old garage for that purpose and a new and larger one was built.

Miramichi Hatchery.—As an application had been received for permission to utilize the small lake at the headwaters of Stewart brook, from which the water supply is taken, for the purpose of cultivating cranberries, it was deemed advisable to ascertain the extent to which the discharge from this lake contributes to the total flow of the brook, in order to have assurance that no interference with the supply would be involved. Measuring weirs were established both at the outlet of the lake and at a point on the brook immediately above the hatchery supply dam. The indications are that the outflow from the lake contributes only to a very small degree to the total volume of the brook and that from this standpoint there need be little apprehension that the water supply would be seriously interfered with. Other factors entering into the situation, such as possible contamination of the water supply by insecticides used in the cultivation of cranberries, led to further consideration of the matter and no final decision was reached at that time. The possibility of utilizing the lake as a storage basin to supplement the water supply for the hatchery was also looked into, but, due to the nature of the shores and the fact that storage would involve the prevention of the escape of water to another watershed, it was not considered that the amount of water that could be made available would justify the expense involved in the development.

Charlo Hatchery.—Following consideration of the various sites for a hatchery in Restigouche county which had been completed during the previous year, that on the south branch of Charlo river was selected as providing the most suitable conditions from all standpoints. Surveys of the site to be acquired were made and transfers of the lands to the department were completed. As the previous year's surveys were of a preliminary nature, complete and detailed surveys of the ground were made, including the site for the dam and the route of the pipe line for a water supply to afford information for the preparation of plans and specifications for the establishment.

Springdale Brook, Kings County.—An instrumental survey of the possibilities of a site for the establishment of a system of rearing ponds was made at this brook, which rises from a large spring issuing from the higher ground above, and a weir for measuring the volume of the flow was installed.

PRINCE EDWARD ISLAND

Cardigan Rearing Ponds.—Following investigations and surveys of streams in various parts of Prince Edward Island during the previous year, a site for the establishment of a series of rearing ponds was selected on Cardigan stream a short distance from Cardigan, Kings county. The necessary land was acquired and after designs had been completed the construction of a system of twenty-four circular rearing ponds each 25 feet in diameter was proceeded with under the supervision of an engineer. A wooden cribwork dam was built on Cardigan stream to afford a reservoir and from it a 12-inch diameter wire-wound wood stave pipe was laid, with separate 2½-inch branch pipes from it to each pond. A concrete slab eight feet in diameter was provided in the centre of each pond bottom and from the centre of this a drain leads down to a common drainage box extending under all the ponds and to the stream. A standpipe erected in the centre drain serves to maintain the water of each pond to the desired level and screens built on a framework around the standpipe prevent the escape of the young fish.

A bungalow and a building for a garage, icehouse, feed room, cold storage and storage space, both similar in all respects to those provided for the Coldbrook ponds, were erected at suitable locations on the site.

STREAM IMPROVEMENT

Following the investigation of the previous year it was decided to erect two dams on Burpee brook, near Frederickton, New Brunswick, to create pools for the improvement of conditions for trout. A type of construction known as a V-type dam was adopted. This consists of bank cribs on either side of the stream with the dam erected between them, but instead of extending straight across it is built in the form of a "V" with the apex upstream. The crest of the dam is lower at the apex of the "V" than at the ends, and the tendency is for the water, in passing over the crest, to dig a deep hole or pool immediately below without endangering the anchorage at the ends. Sufficient apron is provided below the apex to prevent undermining.

MISCELLANEOUS

Bait Freezers.—Following negotiations with the Consolidated Paper Company, Limited, arrangements were made for it to erect a snow house at Baie St. Claire on Anticosti Island to provide for the storage of snow for use by the fishermen of that district.

Fisheries Station—Schooner Passage.—Plans and specifications were prepared for a new float, measuring 60 feet by 20 feet, and mooring piles at the Schooner Passage Fisheries station, Rivers inlet, British Columbia. The work was then taken in hand by the Public Works Department and was completed by contract in an entirely satisfactory manner. This station is now in good shape and should not require any heavy expenditure for several years.

Marine Ways—New Westminster.—Preliminary work in connection with the proposed new marine ways and warehouse at New Westminster took considerable time of an engineer. The site previously arranged for on the Westminster Paper Mills property, located on the North arm, Fraser river, proved to be not available after plans and specifications had been prepared and it became necessary to locate another. A suitable site was found lower down the river on property under ownership of the Canadian National Railways and reports regarding it were prepared and submitted.

Licence Area No. 17.—The change in boundaries of Fishing Area No. 17, gulf of Georgia, necessitated new plans and new boundary signs and the inquiry into the operation of salmon traps on the west coast of Vancouver Island called for detail plans of same.

Pavilion Lake.—An inspection was made of Pavilion lake in connection with the proposal to provide a screen near the outlet for the purpose of preventing trout from entering irrigation ditches. This occurred shortly before the province took over the administration of sport fish in non-tidal waters.

FISHERIES RESEARCH BOARD

Pumping Supply from Cowichan River at Cowichan Lake Hatchery.—The Cowichan Lake hatchery on Vancouver Island is being operated by the Fisheries Research Board of Canada in connection with its biological survey of the Cowichan River watershed. The original gravity water supply from Oliver creek is still being delivered to the hatchery but during summer months, whilst trout fry are being retained in ponds, this supply fails to meet full requirements. To augment the supply and to assist in a proposed expansion of the pond system, it was decided to arrange for an additional supply of about 200 gallons per minute to be delivered to the hatchery by means of pumping from the Cowichan river. The two supplies vary greatly in temperature during the course of one year and in order to equalize the water temperature at all times it was proposed that both supplies should be delivered into a head tank outside the hatchery building where they would mix and the supply mains were rearranged so that water would be delivered both to hatchery and rearing ponds directly from this head tank.

A circular tank of 1,500 gallons capacity was erected on the chosen spot at a suitable elevation outside and adjoining the hatchery building and a centrifugal pump, belt connected to a 5-horsepower Diesel oil engine was installed, having a 5-inch diameter iron pipe suction line 250 feet in length and a discharge line of 150 feet of similar pipe and capable of delivering 200 Imperial gallons per minute. The total lift from the Cowichan river at low stage to delivery point in the tank is approximately 20 feet and the installation was completely satisfactory.

Maps, etc.—Considerable work was done during the year in connection with maps of the Fraser River watershed for preliminary use in connection with the International Pacific Salmon Fisheries Commission and the office maps were revised from time to time as additional data was received.

OYSTER LEASING

Leasing of areas for oyster farming in Prince Edward Island continued during the year, 103 leases having been issued. The total number of leases in effect at the end of the year was 253, covering 933 acres, and, in addition, 917 applications were before the department.

As action on applications includes investigation of the areas as well as surveys to define the boundaries, there is some delay before they can be finally dealt with. In many instances, however, where they have been approved the applicants are permitted to proceed with development work on the areas and accordingly the areas under cultivation exceed the number of leases completed. A considerable number of the incompleted applications are for areas in regions where investigations to determine the desirability of leasing have not been finally completed and where applications are submitted in anticipation of their receiving favourable consideration.

A total of 218 surveys of areas for leases as well as 18 other surveys, some of which involved considerable work, were completed by the department's surveyor, during the year.

Following the completion of an agreement with the Province of Nova Scotia under which jurisdiction over the oyster areas of the province was transferred to the Dominion, considerable work was involved in assembling information for the preparation of a policy for the leasing of suitable areas for oyster farming.

A detailed report of oyster culture work under the department will be found in Appendix No. 3.

APPENDIX No. 7

SCALLOP INVESTIGATIONS

REPORT BY CHARLES BRUCE, A.M.E.I.C., FISHERIES ENGINEER

As it had been urged by those interested that previous exploratory work by the department in an endeavour to locate scallop beds of commercial value off the coast of Prince Edward Island had not been entirely successful due to the fact that the equipment used was not heavy enough to uncover the beds and reach the shellfish in the full quantities in which they were believed to be present, further work in these areas was undertaken during the year. A scallop dredger from the bay of Fundy area, where the heaviest equipment is generally used, was engaged and exploratory work was carried on in all the likely areas off the west, north and east coasts of the island. While a few scallops were taken no beds were found on which they were present in sufficient quantities to support a commercial fishery.

APPENDIX No. 8

SUMMARY OF EXPENDITURE AND REVENUE BY PROVINCES, OF
THE FISHERIES SERVICE 1867—1937-38, UNDER THE
DOMINION GOVERNMENT

	Expenditure		Revenue	
	\$	cts.	\$	cts.
Nova Scotia.....	7,579,593	20	450,666	50
Prince Edward Island.....	1,270,052	30	140,967	36
New Brunswick.....	5,419,071	11	664,514	40
Quebec.....	2,617,444	52	342,997	80
Ontario.....	3,458,675	50	520,243	81
Manitoba and Northwest Territories.....	23,414	29	4,779	25
Manitoba.....	1,763,968	84	334,589	81
Northwest Territories.....	58,258	58	9,785	23
Alberta.....	518,261	96	226,736	41
Saskatchewan.....	576,033	42	101,945	16
British Columbia.....	16,524,899	60	2,900,001	50
Yukon.....	29,343	94	15,187	75
Hudson Bay District.....			821	83
	39,839,017	26	5,713,236	81
Cruisers Nova Scotia, Prince Edward Island, New Brunswick.....	6,251,004	29		
Expenditure, General.....	5,742,289	40		
Fishing Bounty.....	8,868,140	06		
	60,700,451	01		

FINANCIAL STATEMENT, 1937-38

Vote No.	Appropriation	Amount		Expenditure	
		\$	cts.	\$	cts.
136 and 463	(Salaries and disbursement of fishery officers and guard-ians.....)	934,243	13	504,983	22
	Fisheries Patrol Service.....			235,184	63
	Fisheries Protection Service.....			194,075	28
137	Building fishways and clearing rivers.....	9,000	00	934,243	13
138	To assist in the conservation and development of the deep sea fisheries, etc.....			5,452	07
139	Fish Culture.....	56,600	00	50,065	27
140	Oyster Culture.....	231,220	00	218,055	35
141	International Fisheries Commission (Halibut).....	21,000	00	20,642	15
142 and 463	Fisheries Research Board of Canada.....	25,000	00	24,950	80
143	To provide for payment of a Bounty for the destruction of Harbour Seals.....	231,836	17	231,836	17
442	Pacific Salmon Fisheries Commission (Fraser River Sockeye).....	30,000	00	20,355	00
443	To aid in re-establishment and re-organization of Dried and Pickled Fish Branches of Fishery industry of the Atlantic Coast, etc.....	15,000	00	7,718	56
Spec. Supp. 299	To enable, in co-operation with Provincial Governments concerned, aiding fishermen to establish, or better establish themselves in the industry.....	500,000	00	35,983	97
Spec. Supp. 300	To aid in expanding the sale of the products of the Canadian Fishermen in foreign and domestic markets.....	400,000	00	218,004	21
		85,000	00	83,425	14
8	Civil Government Salaries.....	2,538,899	80	1,850,731	82
8	Civil Government Contingencies.....	111,426	00	110,475	23
Statutory	Fishing Bounty.....	22,000	00	19,983	69
Statutory	Minister's salary.....	160,000	00	159,857	25
		10,000	00	9,999	96
	*Pacific Halibut Treaty Special Account (Finance Department).....	2,842,325	30	2,151,047	95
	Pacific Salmon Treaty Special Account (Finance Department).....			4,124	74
				6,938	88
	*Balance due by United States Government on account of divisible expenditures for fiscal year 1937-38.....			2,162,111	57

STATEMENT OF REVENUE RECEIVED DURING THE FISCAL YEAR 1937-38

Class	Total	Gen. Acct.	N.S.	P.E.I.	N.B.	Que.	Ont.	B.C.	Yukon
Fisheries revenue.....	60,442 98		12,002 75	1,875 31	10,598 75	304 50	6 00	35,180 67	475 00
Fines and forfeitures.....	7,622 27		716 10	418 25	561 72	7 00		5,919 20	
Casual revenue.....	6,075 50	583 16	227 58	4,498 65	179 43	36 20		550 48	
Fish culture revenue.....	198 75			11 50	153 50			33 75	
Modus vivendi.....	221 00		87 00					134 00	
Pelagic sealing revenue.....	45,262 51	45,262 51							
Premium, discount and exchange.....	0 85		0 40	0 30	0 15				
	119,823 86	45,845 67	13,033 83	6,804 01	11,493 55	347 70	6 00	41,818 10	475 00

DEPARTMENT OF FISHERIES

SALARIES AND DISBURSEMENTS OF FISHERIES OFFICERS
EXPENDITURE 1937-38 AND SUMMARY

<i>Nova Scotia—</i>	
Head Office.....	\$ 24,779 33
District No. 1.....	41,431 98
District No. 2.....	52,361 10
District No. 3.....	57,508 64
	<hr/> \$ 176,081 05
<i>Prince Edward Island—</i>	
District No. 1.....	23,045 86
District No. 2 (Mag'n. Is. Que.).....	6,455 19
	<hr/> \$ 29,501 05
<i>New Brunswick—</i>	
District No. 1.....	\$ 28,233 67
District No. 2.....	57,184 28
District No. 3.....	34,234 35
	<hr/> \$ 119,652 30
<i>Lobster and Smelt Investigation.....</i>	4,552 03
<i>J. J. Loxier Investigation.....</i>	471 22
<i>General East.....</i>	10,065 43
<i>British Columbia—</i>	
Head Office.....	\$ 30,889 22
District No. 1.....	37,033 62
District No. 2.....	34,303 76
District No. 3.....	43,914 60
<i>Canned Salmon Inspection.....</i>	11,476 61
<i>General West.....</i>	7,042 33
	<hr/> \$ 164,660 14
	<hr/> \$ 504,983 22

SUMMARY

Nova Scotia.....	\$ 181,028 11
Prince Edward Island.....	26,039 66
New Brunswick.....	126,169 20
Quebec.....	7,086 11
British Columbia.....	164,660 14
	<hr/> \$ 504,983 22

FISHERIES PATROL SERVICE—EXPENDITURE 1937-38 AND SUMMARY

<i>Nova Scotia—</i>	
District No. 1—	
Chartered Boats.....	\$ 969 57
District No. 2—	
Departmental Boats.....	\$ 15,722 96
Chartered Boats.....	4,174 42
District No. 3—	
Departmental Boats.....	\$ 13,337 17
Chartered Boats.....	1,203 00
	<hr/>
	\$ 35,407 12
<i>Prince Edward Island—</i>	
District No. 1—	
Departmental Boats.....	\$ 2,981 99
Chartered Boats.....	9,597 12
	<hr/>
	\$ 12,579 11
<i>New Brunswick—</i>	
District No. 1—	
Departmental Boats.....	\$ 14,749 89
District No. 2—	
Departmental Boats.....	1,674 45
Chartered Boats.....	15,574 76
	<hr/>
	17,249 21
<i>British Columbia—</i>	
District No. 1—	
Departmental Boats.....	\$ 21,533 17
Chartered Boats.....	731 97
General.....	173 03
District No. 2—	
Departmental Boats.....	32,539 37
Chartered Boats.....	27,865 83
General.....	15 00
District No. 3—	
Departmental Boats.....	\$ 18,688 74
Chartered Boats.....	28,903 77
General.....	12 00
Digby Island.....	5,942 77
Poplar Island.....	2,051 06
Air Service.....	16,742 59
	<hr/>
	155,199 30
	<hr/>
	\$ 235,184 63
	<hr/>

SUMMARY

Nova Scotia.....	\$ 35,407 12
Prince Edward Island.....	12,579 11
New Brunswick.....	31,999 10
British Columbia.....	155,199 30
	<hr/>
	\$ 235,184 63
	<hr/>

FISHERIES PROTECTION SERVICE—EXPENDITURE SUMMARY FOR 1937-38

East Coast..	\$ 79,354.84
West Coast..	114,720.44
	<hr/>
	\$194,075.28
	<hr/>

FISH CULTURE EXPENDITURE 1937-38 AND SUMMARY

	Total by Hatcheries		Total by Provinces	
	\$	cts.	\$	cts.
NOVA SCOTIA				
Antigonish.....	18,797	52		
Bedford.....	7,011	88		
Cobequid.....	8,006	37		
Coldbrook Ponds.....	15,835	60		
Grand Lake Pond.....	6,027	70		
Lindloff.....	3,492	50		
Margaree.....	21,037	06		
Margaree Ponds.....	4,238	01		
Middleton.....	7,272	99		
Nictaux Ponds.....	1,634	55		
River Phillip Ponds.....	853	03		
Sackville River Ponds.....	274	65		
Yarmouth.....	11,470	64		
Milbrook Ponds.....	2,285	95		
			108,238	45
PRINCE EDWARD ISLAND				
Kelly Pond.....	5,586	90		
Morrell River Pond.....	655	94		
New Trout Rearing Pond.....	12,687	31		
			18,930	15
NEW BRUNSWICK				
Florenceville.....	9,095	55		
Grand Falls.....	8,250	60		
Miramichi.....	7,216	27		
Miramichi Pond.....	1,626	35		
New Mills Pond.....	3,915	33		
New Hatchery, Dwelling and Ponds at Charlo Falls, Restigouche Co.....	4,861	05		
Restigouche.....	5,084	07		
St. John.....	11,583	38		
St. John Pond.....	6,866	77		
			58,499	37
Supervisors, Engineers and Staff—East.....	7,437	42		
			7,437	42
General Account—East—				
Chamcook Lake, N.S.....	131	22		
Wittenburg Rearing Pond, N.S.....	30	00		
Miscellaneous.....	3,281	05		
			3,442	27
BRITISH COLUMBIA				
Argenta (Lardo).....	319	01		
Cultus (Smith Falls).....	5,484	36		
Lloyds Creek.....	3,526	41		
Nelson.....	3,652	50		
Penask.....	1,918	31		
Summerland.....	693	21		
General Account—				
Beaver Lake.....	952	15		
Cranbrook.....	1,845	81		
Fish Lake.....	486	36		
Inspection Service.....	2,011	83		
Pemberton Hatchery.....	424	68		
Miscellaneous.....	193	06		
			21,507	69
			218,055	35

SUMMARY

Nova Scotia.....	\$114,333.34
Prince Edward Island.....	19,966.02
New Brunswick.....	62,248.32
British Columbia.....	21,507.69
	<u>\$218,055.35</u>

CONSERVATION AND DEVELOPMENT OF DEEP SEA FISHERIES EXPENDITURE
1937-38

Aids in Expanding Demands for Fish..	\$ 6,924.24
Educational Work..	9,018.57
Grant to Lunenburg Exhibition, N.S...	1,800.00
Grant and Sundry Expenses <i>re</i> Pictou Lobster Carnival, N.S...	527.30
Grant to United Maritime Fishermen..	3,000.00
Educational Work through Extension Department of St. Francois Xavier College..	6,095.28
Bait Collection Service, N.S...	748.00
Destruction of Sea Lions, B.C...	496.52
Transshipment of Fur Seal Skins, B.C...	2,103.11
Fisheries Intelligence Bureau..	3,201.13
Advertising..	2,386.80
Dog Fish Collecting Boat, N.S...	2,240.00
Scallop Investigation, P.E.I...	1,100.00
Aid to Fishing Fleet out of Canso and Petit de Grat, N.S...	6,839.19
Miscellaneous..	5,585.13
	<hr/>
	\$50,065.27

FISHERIES RESEARCH BOARD OF CANADA EXPENDITURE 1937-38

<i>St. Andrews Biological Station, N.B...</i>	\$ 52,456.24
<i>Nanaimo Biological Station, B.C...</i>	62,043.31
<i>Gaspe Experimental Station, Que...</i>	15,856.43
<i>Halifax Experimental Station, N.S...</i>	40,739.53
<i>Prince Rupert Experimental Station, B.C...</i>	39,277.57
<i>General Account...</i>	21,463.09
	<hr/>
	\$231,836.17

DEPARTMENT OF FISHERIES

FISHERIES EXPENDITURE 1937-38 BY PROVINCES

Appropriation	General		Nova Scotia		Prince Edward Island		New Brunswick		Quebec		Ontario		Saskatchewan		British Columbia		Totals	
	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.
Salaries and disbursements fishery officers and gradians.....			131,028	11	26,039	66	126,169	26	7,036	11					164,660	14	504,983	22
Fisheries Patrol Service.....			35,407	12	12,579	11	31,999	10							155,199	30	235,184	63
Fisheries Protection Service.....			64,589	36	6,301	68	8,363	80							114,730	41	194,075	28
Building fishways and clearing rivers.....			477	05	234	52	20	86							4,719	64	5,452	07
Conservation and development of deep sea fisheries, etc.....																		
Fish culture.....	3,585	13	20,664	16	5,429	56	8,417	71	4,949	77	3,332	51	50	00	3,036	43	50,005	27
Oyster culture.....			114,333	32	19,966	02	62,248	32							21,507	69	218,055	35
International Fisheries Commission (Halibut).....			12,073	32	8,568	83									20,642	15	20,642	15
Fisheries Research Board of Canada.....															24,950	80	24,950	80
Bounty for destruction of harbour seals.....															101,320	88	231,836	17
Pacific Salmon Fisheries Commission, Fraser River Sockeye Treaty.....	21,463	06	40,739	53	2,172	50	52,436	24	15,856	43					10,737	50	20,355	00
To aid in re-establishing and reorganizing of dried and pickled fish branches of fishing industry, etc.....			5,840	00			1,605	00							7,718	56	7,718	56
Aid in co-operation with Provincial Governments concerned in re-establishment of needy fishermen.....			66,057	52	51,855	63	50,011	06	1,715	14	34,268	83					35,983	97
Aid in expanding the sale of the fish products of the Canadian fishermen, etc.....	3,557	89	289	76	15,747	90	19,272	90	50,070	00	77,393	99					218,004	21
Fishing bounty.....			89,409	10					2,183	50							83,425	14
									38,427	35							159,857	25
Civil Government salaries.....	28,006	11	628,018	35	148,895	41	360,564	19	120,288	30	114,995	33	50	00	609,171	38	2,010,589	07
Civil Government contingencies.....																	110,475	23
Minister's salary.....																	19,983	69
																	9,999	96
*Special account Halibut (Finance Dept.).....																	2,151,047	59
*Special account Pacific Salmon Comm. (Finance Dept.).....																	4,124	74
																	6,938	88
																	2,162,111	57

*Balances due Canada on divisible expenses at the close of the fiscal year 1937-38 by the United States Government.

APPENDIX No. 9

The following is a statement of the various kinds of licences issued by the Supervisors in their respective districts, during the 1937-38 season:—

MAGDALEN ISLANDS, QUEBEC—ACTING SUPERVISOR J. J. LARABEE

Kind of licences	Number of licences issued
Lobster fishing.....	973
Certificates of identification—Nil	
Licences to can lobsters.....	15
Certificates under section 53—1	
Herring seine.....	18
Herring trap-net.....	21 (4 cod trap-nets)
Smelt gill-net.....	89
Smelt bag-net.....	Nil
	<hr/> 1,116

PRINCE EDWARD ISLAND—ACTING SUPERVISOR J. J. LARABEE

Lobster fishing.....	2,659
Certificates of identification—68 (3 can.)	
Licences to can lobsters.....	74
Oyster fishery.....	222
Quahaug fishery.....	81
Certificates under section 53—2	
Lobster pound.....	Nil
Trap-net fishing.....	1
Salmon trap-net or pound-net	2
Set salmon gill-net.....	3
Gaspereau gill-net permits.....	7
Permits to authorize fishing for oysters in certain contaminated areas.....	110
Scallop fishery	3
Smelt gill-net.....	114
Smelt bag-net.....	200
Leases of oyster privileges—232	
	<hr/> 3,476

NOVA SCOTIA DISTRICT No. 1—SUPERVISOR A. G. McLEOD

Lobster fishing.....	3,081
Certificates of identification—21 (1 can.)	
Licences to can lobsters.....	26
Oyster fishery.....	249
Certificates under section 53—93	
Trap-net fishing.....	36
Salmon trap-net, pound-net or weir	236
Special angling permits.....	180 (2 cancelled)
Set salmon gill-net.....	62
Gaspereau fishing.....	Nil
Scallop fishery.....	Nil
Smelt bag-net.....	41 (10 box-nets)
Smelt gill-net	144
	<hr/> 4,055 (2 cancelled)

NOVA SCOTIA DISTRICT No. 2—SUPERVISOR E. D. FRASER

Kind of licences	Number of licences issued
Lobster fishing.. . . .	4,498 (2 cancelled)
Certificates of identification—179 (3 cancelled)	
Licences to can lobsters.. . . .	45
Oyster fishery.. . . .	208
Quahaug fishery.. . . .	47
Shad gill-net or drift-net.. . . .	79
Certificates under section 53—77 (2 cancelled)	
Lobster pound.. . . .	5
Seine.. . . .	121
Licences to a captain of a Canadian fishing vessel (using an otter or other trawl).. . . .	3
Herring weir.. . . .	19
Trap-net fishing.. . . .	90
Salmon drift-net.. . . .	54
Salmon trap-net, pound-net or weir.. . . .	187
Special angling permits.. . . .	221 (12 complimentary)
Set salmon gill-net.. . . .	348
Permits to catch smelts by use of a dip-net.. . . .	276
Scallop fishery.. . . .	1
Smelt bag-net.. . . .	187
Smelt gill-net.. . . .	178
Lobster pound certificates—207	
Interim receipts.. . . .	Nil
	<hr/> 6,567 (2 cancelled and 12 complimentary)

NOVA SCOTIA DISTRICT No. 3—SUPERVISOR H. H. MARSHALL

Lobster fishing.. . . .	3,786
Certificates of identification—30	
Licences to can lobsters.. . . .	1
Shad gill-net or drift-net.. . . .	1
Certificates under section 53—161	
Lobster pound.. . . .	13
Herring weir.. . . .	49
Trap-net fishing.. . . .	155
Salmon drift-net.. . . .	6
Salmon trap-net, pound-net or weir.. . . .	29
Salmon net permits (Medway river).. . . .	23
Special angling permits.. . . .	646 (1 cancelled)
Set salmon gill-net.. . . .	447 (1 cancelled)
Scallop fishery.. . . .	129
Smelt bag-net.. . . .	23
Smelt gill-net.. . . .	53
Lobster pound certificates—886 (1 cancelled)	
	<hr/> 5,361 (2 cancelled)

NEW BRUNSWICK DISTRICT No. 1—SUPERVISOR J. F. CALDER

Lobster fishing.. . . .	463
Certificates of identification—24	
Shad gill-net or drift-net.. . . .	39
Certificates under section 53—8	
Lobster pound.. . . .	4
Herring weir.. . . .	525
Clam permits.. . . .	204
Salmon gill-net or drift-net.. . . .	106
Herring seine.. . . .	11 (2 cancelled)
Scallop fishery.. . . .	11
Smelt gill-net.. . . .	Nil
Smelt bag-net or box-net.. . . .	Nil
Lobster pound certificates—1,104 (1 missing)	
Lease of Dark Harbour fishing privileges—1	
Lease of Beals Eddy Pond fishery—1	
	<hr/> 1,363 (2 cancelled)

NEW BRUNSWICK DISTRICT No. 2—SUPERVISOR A. L. BARRY

Kind of licences	Number of licences issued
Lobster fishing.. . . .	3,374 (2 cancelled)
Certificates of identification—95 (7 cancelled)	
Licences to can lobsters.. . . .	80 (2 cancelled)
Oyster fishery.. . . .	934 (17 free)
Quahaug fishery.. . . .	91
Shad gill-net or drift-net.. . . .	1
Certificates under section 53—238 (1 cancelled)	
Lobster pound.. . . .	4
Herring weir.. . . .	Nil
Gaspereau pound-net or trap-net.. . . .	113
Salmon gill-net or drift-net.. . . .	190 (1 cancelled)
Salmon trap-net, pound-net or weir.. . . .	284
Special angling permits (black salmon).. . . .	25
Tomcod trap-net.. . . .	1
Smelt gill-net.. . . .	168
Smelt bag-net or box-net.. . . .	6,742 (60 free)
Lobster pound certificates—	
	12,107 (5 cancelled & 77 free)

NEW BRUNSWICK DISTRICT No. 3—SUPERVISOR L. H. PARKS

Shad gill-net or drift-net.. . . .	143
Sturgeon fishery.. . . .	3
Salmon net permits (St. John river).. . . .	86
Gaspereau pound-net or trap-net.. . . .	Nil
Salmon gill-net or drift-net.. . . .	138
Salmon trap-net, pound-net or weir.. . . .	99
Special angling permits (black salmon).. . . .	796
Gaspereau gill-net.. . . .	169
Shad dip-net fishing permits.. . . .	109
Pickarel permit (net fishing).. . . .	1
Whitefish gill-net permits (Grand Lake—Chiputneticook System)	43
Bass fishery.. . . .	59
Smelt bag-net or box-net.. . . .	Nil
Pickarel permits (hook & line).. . . .	98
Interim receipts—100	
	1,744

PROVINCE OF BRITISH COLUMBIA—CHIEF SUPERVISOR J. A. MOTHERWELL

Special angling permits (seasonal).. . . .	936 (1 cancelled)
Anglers' day permits for non-residents.. . . .	845 (5 cancelled)
Abalone fishery.. . . .	3
Indian permits.. . . .	2,267
Crab fishery.. . . .	148
Smelt fishery.. . . .	47 (1 cancelled)
Miscellaneous.. . . .	105 (3 cancelled)
Salmon fishery licences for gill-nets or drift-nets.. . . .	5,189 (89 cancelled)
Salmon trolling.. . . .	3,136 (13 cancelled)
Salmon trap-net.. . . .	5
Salmon purse-seine.. . . .	291 (2 cancelled)
Salmon drag-seine.. . . .	9
Licences to a captain of a salmon purse-seine boat.. . . .	166 (2 cancelled)
Grayfish fishery.. . . .	161
Licences to assistant operators of salmon (purse or drag) seines	1,666 (1 cancelled)
Licences to assistants in boats used in operating salmon gill-nets or drift-nets.. . . .	952 (1 cancelled)
Cod fishery.. . . .	499 (18 cancelled)
Whaling.. . . .	6
Licences to captains of Canadian halibut fishing boats, etc.. . . .	9
Small dragger.. . . .	32
Herring gill-net or drift-net.. . . .	24
Herring purse-seine.. . . .	47 (1 cancelled)
Pilchard purse-seine.. . . .	32
Licences to captains of herring purse-seine boats.. . . .	34
Licences to captains of pilchard purse-seine boats.. . . .	30
Licences to assistant operators of herring purse-seine.. . . .	393
Licences to assistant operators of pilchard purse-seine.. . . .	197
Herring pound permits.. . . .	6
Pelagic sealing certificates—25	
	17,235 (137 cancelled)

YUKON DISTRICT

Kind of licences	Number of licences issued
Special fishery..	24

PACIFIC COAST

Licences to United States halibut fishing vessels..	180
---	-----

ATLANTIC COAST

Licences to United States fishing vessels..	88
---	----

NORTHWEST TERRITORIES

Reduction works..	Nil	
Walrus..	30	(incomplete)
Special angling permits (Hudson Bay & James Bay)..	Nil	
	<hr/>	
	30	

HUDSON BAY & JAMES BAY

Commercial fishing permits..	6	(2 cancelled)
	<hr/>	
Total..	53,352	(152 cancelled 12 complimentary 77 free)

APPENDIX No. 10

COMPARATIVE STATEMENT OF LOBSTER FISHING LICENCES
FROM 1928

PRINCE EDWARD ISLAND AND MAGDALEN ISLANDS

Year	Magdalen Islands	Prince County	Kings County	Queens County	Kings and Queens (Southern portion)	Totals
1928.....	682	925	616	337	.....	2,560
1929.....	659	857	509	271	.....	2,296
1930.....	644	922	573	285	.....	2,424
1931.....	526	894	521	283	.....	2,224
1932.....	526	1,409	308	402	398	3,043
1933.....	599	1,359	324	438	485	3,205
1934.....	825	1,190	483	459	542	3,499
1935.....	931	1,110	538	487	591	3,657
1936.....	984	972	580	536	609	3,681
1937.....	973	1,060	594	417	588	3,632

NOVA SCOTIA—DISTRICT No. 1

Year	Inverness County	Richmond County	Cape Breton County	Victoria County	Totals
1928.....	537	648	462	376	2,023
1929.....	501	636	435	329	1,901
1930.....	496	682	442	343	1,963
1931.....	473	745	458	367	2,043
1932.....	542	897	578	426	2,443
1933.....	656	1,092	773	534	3,055
1934.....	701	1,060	790	561	3,112
1935.....	738	1,026	691	503	2,958
1936.....	845	948	886	506	3,185
1937.....	736	1,028	784	473	3,081

NOVA SCOTIA—DISTRICT No. 2

Year	Halifax Office	Halifax County	Patrol Boat	Guys-boro County	Antigonish County	aPictou and Colchester	aCumberland County	bHants, Colchester and Cumberland County	Totals
1928....	183	976	41	1,021	334	521	171	17	3,264
1929....	153	767	435	1,047	283	358	221	7	3,271
1930....	131	1,135	204	1,087	308	349	255	9	3,478
1931....	142	1,200	170	1,139	273	352	299	15	3,590
1932....	105	1,364	14	1,330	339	462	399	14	*4,029
1933....	68	1,453	59	1,439	350	526	374	18	4,287
1934....	20	1,342	24	1,489	425	589	431	22	4,342
1935....	5	1,435	24	1,473	494	685	426	7	4,549
1936....	1	1,460	.....	1,563	506	732	420	10	4,698
1937....	Nil	1,429	Nil	1,524	567	654	306	18	4,498

a Northumberland Straits side.

b Bay of Fundy side.

* The 1932 total includes two licences issued by the District Supervisor.

DEPARTMENT OF FISHERIES

NOVA SCOTIA—DISTRICT No. 3

Year	Lunenburg	Queens	Shelburne	Yarmouth	Digby	Kings	Annapolis	Totals
1928.....	563	329	966	827	470	25	119	3,299
1929.....	472	217	850	792	463	27	120	2,941
1930.....	504	250	854	768	483	28	135	3,022
1931.....	590	296	1,016	770	430	.....	128	3,230
1932.....	491	290	965	673	312	.....	148	2,879
1933.....	525	262	1,112	720	415	21	141	3,196
1934.....	481	287	1,014	705	354	24	114	2,979
1935.....	562	307	1,100	758	370	21	85	3,203
1936.....	550	304	1,058	831	368	23	90	3,224
1937.....	692	398	1,190	972	384	37	113	3,786

NEW BRUNSWICK—DISTRICT No. 1

Year	Charlotte	Saint John	Albert and Westmorland	Totals
1928.....	433	86	1	520
1929.....	360	53	1	414
1930.....	288	57	2	347
1931.....	281	45	4	330
1932.....	380	101	2	483
1933.....	271	99	1	371
1934.....	*299	94	1	394
1935.....	*362	87	1	450
1936.....	408	85	1	494
1937.....	380	81	2	463

NEW BRUNSWICK—DISTRICT No. 2

Year	Northumberland County	Restigouche County	Gloucester County	Kent County	Westmorland County	Totals
1928.....	297	50	517	501	249	*1,981
1929.....	289	43	406	583	188	*1,834
1930.....	319	46	794	638	327	2,124
1931.....	300	54	647	765	326	2,192
1932.....	394	67	933	997	435	2,826
1933.....	407	77	1,041	989	720	3,234
1934.....	512	74	1,064	1,087	905	3,642
1935.....	509	80	986	1,035	719	3,329
1936.....	503	73	1,091	1,033	619	3,269
1937.....	526	60	1,084	1,008	696	3,774

* The 1928 total includes 367 licences issued by the District Supervisor, the 1929 total 325 licences, the 1934, 3 licences, and 1935 one licence, so issued.

NOTE.—Cancelled licences are not included in the figures in this appendix.

DOMINION OF CANADA

NINTH
ANNUAL REPORT
OF THE
DEPARTMENT OF FISHERIES

(Seventy-second Annual Fisheries Report
of the Dominion)

FOR THE YEAR

1938-39



OTTAWA
J. O. PATENAUDE, I.S.O.
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1939

*To His Excellency the Right Honourable Baron Tweedsmuir of Elsfield, P.C.,
G.C.M.G., C.H., Governor General and Commander-in-Chief of the
Dominion of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit herewith, for the information of Your Excellency and the Parliament of Canada, the Ninth Annual Report of the Department of Fisheries, being the Seventy-second Annual Fisheries Report for the Dominion.

I have the honour to be,

Your Excellency's most obedient servant,

J. E. MICHAUD,
Minister of Fisheries.

DEPARTMENT OF FISHERIES,
OTTAWA, April 6, 1939.

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DEPUTY MINISTER'S REPORT

To the Hon. J. E. MICHAUD, M.P.,
Minister of Fisheries.

SIR,—I have the honour to submit the Ninth Annual Report of the Department of Fisheries, which is the Seventy-second Annual Report on the fisheries of Canada and is for the fiscal year ended March 31, 1939. Among other subjects referred to in the report are the following:—

- Results of Commercial Fishing Operations in the Calendar Year 1938.
- Foreign Trade in Fisheries Products.
- Direct Assistance to Fishermen.
- Assisting Fishermen by Sales Promotion.
- Fisheries Products' Inspection.
- Fish Culture.
- Progress in Oyster Farming.
- Fishing Bounty Payments.
- Pelagic Sealing Returns.
- Instructional Work Among Fishermen.
- Work of the Pacific Halibut Commission.
- Work of the Pacific Salmon Commission.
- Activities of the North American Council on Fishery Investigations.

The appendices include:—

- Reports of the Chief Supervisors of Fisheries
- Report on the Department's Fish Culture Work
- Report on Oyster Culture
- Report on Canned Salmon Inspection
- Report of the Fisheries Engineer.
- Report on Fish Inspection and Technical Instruction to Fishermen
- A Statement of Fisheries Revenue and Expenditure for the Fiscal Year 1938-39, and a Summary of Revenue and Expenditure According to Provinces for the period 1867 to 1938-39.
- A Statement Showing the Number of Fisheries Licenses issued in 1938-39
- A Statement Showing the Number of Lobster Fishing Licenses issued each year since 1928.

REVIEW OF FISHERIES RESULTS FOR THE CALENDAR YEAR 1938

Commercial landings of fish and shellfish by Canadian fishermen in 1938 showed some decrease from the total for 1937, but the marketed value of the year's production, \$40,492,976, showed an increase of more than a million and a half, and was greater than the marketed value of any other year since 1930. Total catch from sea and freshwater fisheries was 10,741,150 hundredweights, or approximately 176,900 hundredweights less than in the year before. The

decrease was in the landings from the sea fisheries, which amounted to 9,845,723 hundredweights as against 10,026,396 hundredweights in the preceding year. The landings from the inland or freshwater fisheries, 895,427 hundredweights, increased by between three and four thousand hundredweights. The landed value of the sea fisheries catch or, in other words, the value of the catch to the fishermen as landed, increased by more than \$58,000, notwithstanding that the aggregate quantity of fish and shellfish taken during the year was smaller than the catch of 1937. On the other hand, in the case of the inland fisheries there was a decrease of slightly more than \$422,000 in landed value, in spite of the fact that the catch had increased. On the marketed value side the increase was in the return from the sea fisheries—a gain of \$1,790,101. The marketed value of the catch from the inland fisheries, \$6,718,828, decreased by \$273,419. Five of the provinces (Manitoba, Alberta, Prince Edward Island, Quebec and British Columbia) had increases in marketed value to their credit, as will be seen from the table below. The great gain, however, over \$2,517,000, was in British Columbia.

Major Fisheries.—Taking the Dominion as a whole, the salmon fishery again led in the marketed value of the year's catch. There was an increase of more than 42,500 hundredweights in the landings of salmon, and their marketed value, \$14,992,500 roundly stated, was greater by over \$2,622,000 than the marketed value for 1937. The lobster fishery, second to the salmon fishery in point of marketed value return, yielded an increased catch as compared with the 1937 total, but a weakening of the prices in export markets had the effect of reducing marketed value by more than \$840,000. The value of the lobster catch as marketed was \$3,793,219. In the case of the cod fishery, there was an increase both in catch and marketed value. The landings by the cod fishermen, approximately 1,702,000 hundredweights, increased by nearly 178,400 hundredweights, and their marketed value, \$3,335,231, showed a gain of \$195,000. The herring fishery was not as successful as in the preceding year, and both catch and marketed value decreased. Whitefish were again of first importance in the freshwater fisheries, although catch and value alike decreased. Total landings of whitefish were 154,244 hundredweights and their marketed value was \$1,650,347 which meant a decrease of approximately 19,400 hundredweights on the one side and \$237,500 on the other side. Other fish to show marketed value of more than one million dollars were as follows, some of them taken in the sea fisheries, others in freshwater operations: Halibut, \$1,789,444; sardines, \$1,393,129; haddock, \$1,361,992; trout, \$1,036,292; pickerel, \$1,031,868.

Employment and Capital Investment.—Gear, equipment and plants in use in the fisheries during the year represented a total capital investment of \$48,561,442, or \$3,634,700, roundly stated, above the investment of 1937. The major part of the increase, nearly \$3,629,000, was in the investment in the sea fisheries, and was accounted for by additional investment in canning and curing establishments. Total investment in boats, vessels, gear, etc., used in primary operations was less by \$197,000 than it had been in 1937, and totalled a little less than \$26,599,000.

The total number of persons directly employed in fisheries operations during 1938 was 85,994, or 1,969 more than the number employed in the preceding year. Of the total number, 57,034 were engaged in the primary operations of the sea fisheries, 14,376 in primary freshwater operations and the remainder, 14,484, were at work in canning and curing establishments connected with the sea fisheries.

Marketed value of the 1938 production, by provinces, is shown in Table I below, as well as comparative figures for each of the three preceding years. Table II shows marketed value figures for the sea fisheries and freshwater fisheries, respectively, for 1938.

TABLE I
MARKETED VALUE BY PROVINCES

	1938	1937	1936	1935
	\$	\$	\$	\$
Nova Scotia.....	8,804,231	9,229,834	8,905,268	7,852,899
New Brunswick.....	3,996,064	4,447,688	4,399,735	3,949,615
Prince Edward Island.....	930,874	870,299	953,029	899,685
Quebec.....	1,957,279	1,892,036	2,108,404	1,947,259
Ontario.....	3,353,775	3,515,666	3,209,422	2,852,007
Manitoba.....	1,811,124	1,796,012	1,667,371	1,258,335
Saskatchewan.....	468,646	527,199	367,025	252,059
Alberta.....	492,943	433,354	309,882	225,741
British Columbia.....	18,672,750	16,155,439	17,231,534	15,169,529
Yukon.....	5,290	8,767	13,385	20,725
Totals.....	40,492,976	38,976,294	39,165,055	34,427,854

TABLE II

	Sea	Inland	Total
	\$	\$	\$
Nova Scotia.....	8,804,231		8,804,231
New Brunswick.....	3,971,599	24,465	3,996,064
Prince Edward Island.....	930,874		930,874
Quebec.....	1,394,694	562,585	1,957,279
Ontario.....		3,353,775	3,353,775
Manitoba.....		1,811,124	1,811,124
Saskatchewan.....		468,646	468,646
Alberta.....		492,943	492,943
British Columbia.....	18,672,750		18,672,750
Yukon.....		5,290	5,290
Totals.....	33,774,148	6,718,828	40,492,976

SEA FISHERIES RESULTS

Figures showing by provinces total commercial production of sea fish and shellfish during each of the calendar years 1938 and 1937 are given in the following table:

	1938	1937
	lbs.	lbs.
British Columbia.....	456,286,400	495,419,500
Quebec*.....	86,507,800	71,596,600
New Brunswick*.....	127,173,100	137,790,700
Prince Edward Island.....	29,420,400	27,525,000
Nova Scotia.....	285,184,600	270,307,800
Totals.....	984,572,300	1,002,639,600

* Some reference to inland fisheries production in Quebec and New Brunswick will be found on page 10 and in the report of the Eastern Chief Supervisor, which begins on page 22.

Detailed references to the results of operations in various sea fisheries will be found in Appendix No. 1, which embodies the respective reports of the department's Chief Supervisor, Eastern Division, and Chief Supervisor, Western Division. It will be sufficient here to point out that production in most of the

more important fisheries was greater in 1938 than it had been in 1937 though aggregate catch from the sea fisheries decreased. Total Atlantic coast landings of cod, for instance, amounted to 168,338,800 pounds, or approximately 17,400,000 pounds more than in 1937. Atlantic herring landings, 114,906,400 pounds, were about 7,160,000 pounds greater than in the preceding year. The haddock, lobster, mackerel and sardine fisheries each showed an increase in catch, with the totals for 1938 amounting to 39,358,900 pounds in the case of haddock, 31,438,500 pounds of lobsters, 28,556,500 pounds of mackerel and 184,450 barrels of sardines.

On the Pacific coast the catch of salmon was 173,466,400 pounds, as against 169,173,600 in 1937. The quantity of halibut landed in British Columbia by Canadian fishing vessels was 12,024,700 pounds, an increase of 303,000 pounds in round figures. British Columbia's herring production, however, decreased quite sharply and amounted to slightly less than 132,892,000, as compared with 192,979,500 pounds in the preceding year. While the herring catch decreased, the landings of pilchards, like the landings of salmon and halibut, showed a gain. In 1937 the pilchard fishermen landed 96,148,500 pounds, but in 1938 their catch was 103,537,000. The combined landings from all of British Columbia's fisheries were less in 1938, however, than it had been in the previous year.

The Lobster Fishery.—The lobster fishery in the three Maritime provinces and in the Magdalen Islands comes under the department's administration and a number of references to it will be found in the Eastern Chief Supervisor's report in Appendix No. 1. In the mainland areas of Quebec, however, administration of all the fisheries is in provincial hands. The following table gives the figures of lobster catch, pack, shipments in shell, meat and tomalley for each of the four Atlantic provinces and for the Magdalen Islands, separately, for the years 1938, 1937, 1936 and 1935:

CATCH

	1938		1937		1936		1935	
	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$		\$		\$
Nova Scotia.....	155,405	2,282,169	158,961	2,757,880	145,091	2,570,274	176,836	2,732,872
New Brunswick...	68,474	721,612	72,586	1,089,002	56,499	916,850	54,831	818,699
Prince Edward Island.....	71,213	606,134	58,238	538,792	59,286	614,789	63,876	605,107
Quebec, including Magdalen Ilds...	19,293	183,304	20,165	247,755	22,397	281,515	24,426	222,064
(Magdalen Ilds).	17,181	155,917	17,304	199,527	19,696	251,426	21,707	193,765
*Totals.....	314,385	3,793,219	309,950	4,633,429	283,273	4,383,428	319,969	4,378,742

SHIPPED IN SHELL

Nova Scotia.....	82,530	1,423,138	89,904	1,816,045	73,158	1,535,573	90,840	1,652,082
New Brunswick...	18,554	264,267	23,528	422,708	19,750	375,899	20,537	381,092
Prince Edward Island.....	11,072	117,044	2,064	26,153	2,743	35,939	2,991	32,430
Quebec, including Magdalen Ilds...	6,435	59,829	8,057	101,623	7,134	86,276	783	8,200
(Magdalen Ilds.)	4,839	38,485	6,058	64,148	5,842	72,668	.....	.....
*Totals.....	118,591	1,864,278	123,553	2,366,529	102,785	2,033,687	115,151	2,073,804

QUANTITY CANNED

	1938		1937		1936		1935	
	Cases	Marketed Value	Cases	Marketed Value	Cases	Marketed Value	Cases	Marketed Value
		\$		\$		\$		\$
Nova Scotia.....	37,838	734,086	34,649	817,814	37,690	960,621	46,863	1,021,258
New Brunswick..	23,060	403,473	26,957	624,128	20,428	512,055	18,275	404,260
Prince Edward Island.....	24,625	474,397	20,952	497,846	22,345	563,286	25,170	556,596
Quebec, including Magdalen Ilds...	6,481	121,841	6,023	144,332	7,639	194,005	9,597	213,519
(Magdalen Ilds.)	6,223	115,843	5,623	134,448	6,927	177,714	8,656	193,615
*Totals.....	92,004	1,733,797	88,581	2,084,120	88,102	2,229,967	99,905	2,195,633

* Totals are for the four provinces.

TOMALLEY

	1938		1937		1936		1935	
	Cases	Marketed Value	Cases	Marketed Value	Cases	Marketed Value	Cases	Marketed Value
		\$		\$		\$		\$
Nova Scotia.....	3,684	33,873	3,588	37,250	3,668	35,512	3,528	33,560
New Brunswick...	686	5,128	1,215	10,039	1,174	9,796	617	4,497
Prince Edward Island.....	1,559	14,198	1,155	11,935	1,499	15,564	1,358	15,661
Quebec, including Magdalen Ilds...	119	1,094	174	1,080	128	1,234	36	345
(Magdalen Ilds.)	116	1,049	155	931	108	1,044	15	150
*Totals.....	6,048	54,293	6,132	60,304	6,469	62,106	5,539	54,063

LOBSTER MEAT

	1938		1937		1936		1935	
	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value	Cwts.	Marketed Value
		\$		\$		\$		\$
Nova Scotia.....	1,131	91,072	1,149	86,771	535	38,568	510	25,972
New Brunswick...	974	48,744	635	32,127	382	19,100	577	28,850
Prince Edward Island.....	11	495	62	2,858	.....	.....	6	420
Quebec, including Magdalen Ilds...	12	540	12	720	.....	.....	.....	.....
(Magdalen Ilds.)	12	540	.....	.....	.....	.....	.....	.....
*Totals.....	2,128	140,851	1,858	122,476	917	57,668	1,093	55,242

* Totals are for the four provinces.

INLAND FISHERIES

Two of the areas in which freshwater fisheries are carried on, Alberta and Manitoba, showed increase in the value of fisheries production in 1938 as compared with 1937, but elsewhere there were decreases, with the net result that freshwater production as a whole was valued at only \$6,718,828, or \$273,400 less, in round figures, than in 1937. The major decrease, close to \$262,000, was in Ontario, and here the reduction was due in much the largest part to the lessened success of the blue pickerel fishery. The catch of blue pickerel—it is only in Ontario that this particular species of fish is taken—was less by some 21,300 hundredweights than in the year before when it had totalled about

94,500 hundredweights, roundly stated. The marketed value of the 1938 catch, slightly over \$497,500, showed a decrease of \$315,100.

The gain in Alberta was \$59,600, and in Manitoba \$15,100. In Saskatchewan's fisheries there was a decrease of \$58,500 in marketed value, while in the case of Quebec's freshwater fisheries, the reduction was \$21,200. New Brunswick's inland output fell off by nearly \$3,000, and in the Yukon Territory there was a decrease of close to \$3,500. Round figures have been given here in all cases. The following table shows the catches of the principal varieties of freshwater fish in 1938 and each of the three preceding years:

	1938	1937	1936	1935
	cwt.	cwt.	cwt.	cwt.
Whitefish.....	154,244	173,675	144,603	147,456
Pickarel.....	128,812	143,020	145,635	109,548
Tullibee.....	57,932	55,966	59,265	39,721
Trout.....	72,555	70,588	72,825	66,242
Pike.....	62,283	51,320	54,370	44,761
Herring.....	55,700	50,236	50,919	34,536
Perch.....	43,067	34,672	31,090	71,153
Blue pickerel.....	73,171	94,496	68,995	51,230

FOREIGN TRADE IN FISHERIES PRODUCTS

Canada's most important single export market for fisheries products is in the United States and when general business was somewhat less brisk in that country in 1938 than it had been in 1937 Canadian fish sales across the border decreased quite substantially, and that tells the major part of the story of a drop in the Dominion's foreign fisheries trade during the year. Total export trade, \$27,506,000, roundly stated, was \$1,327,000 below the 1937 total and of this reduction over \$1,271,000 was in the business done with the United States. Import trade in fisheries products—principally trade in sardines from Norway and canned tuna and crabs from Japan and the United States—was approximately \$190,000 greater than in 1937 or \$2,962,000 but, even at that, it was only about a ninth as great as the export business.

Sales to Great Britain, the country second in importance among the export customers of the Canadian fishing industry, increased by about \$170,000. In the case of trade with countries other than Britain and the United States the year brought a decrease of over \$225,000.

Given in round figures, the value of the exports in 1937 and 1938, respectively, were as follows:

	1938	1937
	\$	\$
Total Sales.....	27,506,000	28,833,000
Sales to the United States.....	12,709,300	13,980,700
Sales to the United Kingdom.....	6,847,600	6,678,100
Sales to Countries Other than the United States and the United Kingdom.....	7,949,000	8,175,000

Shown by classes of products, the trade for 1938 and the preceding year was as follows, with round figures used in all cases:

	1938	1937
	\$	\$
Fresh and Frozen Fish.....	11,344,300	12,182,300
Canned Fish.....	10,208,200	10,608,800
Salted, Pickled and Smoked Fish.....	3,740,700	3,982,500
Miscellaneous Fish Products.....	1,237,300	1,210,400
Fish and Whale Oils.....	975,500	849,900

Much the greater part of the export business in fresh and frozen fish is done, of course, with the nearest market, the United States, but it is possible to make deliveries to much more distant countries and halibut and salmon in the aggregate amount of more than 8,171,000 pounds, and valued at nearly \$1,203,500, were shipped to the United Kingdom, in addition to some smaller sales to other overseas markets. The trade with the Old Country in frozen halibut, mainly from British Columbia, increased by 50 per cent in volume, as compared with the 1937 trade, and by something more than 50 per cent in value. In the year's "fresh and frozen" trade with the United States, live lobsters were the product of first importance, from the dollars-and-cents standpoint, with sales totalling nearly 10,688,000 pounds in quantity and \$1,952,000 in value. Other large items entering into the business with the United States in fresh and frozen products were whitefish, valued at approximately \$1,514,900, smelts, \$620,900, salmon, \$574,150, halibut, \$555,400, trout, \$526,100, cod, \$253,100 and haddock, \$191,400.

Canned salmon continued to hold first place, reckoning in value, not only among the exports in the canned fish group but among all kinds of fisheries exports. Shipments of this product (practically all of Canada's pack of canned salmon is put up in British Columbia) went to nearly forty different export markets and were valued in all at about \$7,128,000. Business was not quite as satisfactory, however, as it had been in 1937, and that was the case also as regards the business in canned lobsters and canned sardines, Atlantic Coast products, which ranked next after salmon in export importance as rated in dollars. The major share of the external trade in canned lobsters was done with the United Kingdom, Sweden, the United States and France and in canned sardines with Australia and British South Africa although sardine sales were made to some twenty other countries. Britain purchased more Canadian lobster than in 1937, or 2,775,800 pounds as compared with 2,225,400, but shipments to the rest of the world decreased. Canned sardine trade was not quite as good as in 1937.

The decrease of approximately \$241,000 in the value of the exports of salted, pickled and smoked fish was not an occasion for much surprise, keeping in mind the unsettlement of conditions which has existed in many of the principal markets for these products in the past few years. The disturbed situation in the Far East was sufficient in itself to account for more than half of the net decrease when it resulted in a sharp fall in the exports of drysalted herring from British Columbia to China and Japan. The reduction in the business in dried fish from the Atlantic Coast was about \$63,000.

Bigger trade in pilchard oil was the main factor in raising total export business in oils above the 1937 figures. Exports of pilchard oil—all of Canada's pilchard oil comes from British Columbia—were more than twice as large as they had been in the preceding year, or 1,788,165 gallons; the value increase, though not proportionate to the rise in volume, reached the respectable sum of \$85,300. Exports of cod liver oil increased both in volume and value. There was decrease in the quantity of whale oil shipped abroad but its value, close to \$145,000, was less than \$5,000 below the 1937 mark.

Fish meal is the principal commodity in the "Miscellaneous Products" group but, as a matter of fact, it was other products which lifted the 1938 export total for this group above the 1937 level. Canadian fish meal goes in largest part to two countries—the United States and the United Kingdom; in 1938 the British purchases increased substantially but the sales to the United States were well below the 1937 figures. All told, the business in meal decreased by \$81,150. The decrease in the dollar return from the meal sales was offset, with a few thousand dollars left to the good, by improved business in bait fish, fish offal, and fish livers. It was the trade in fish livers which accounted in most part for the betterment. Over 20,300 hundredweights of livers, principally

halibut livers, were shipped out of the country as against 7,100 hundredweights in 1937 and they were valued at nearly \$280,100 as against less than \$215,000. Nearly all of the liver sales were to the United States.

DIRECT ASSISTANCE TO FISHERMEN

Helping fishermen through joint federal-provincial action to re-establish themselves in the fishing industry, or better establish themselves, a plan adopted in 1936-37 and continued in the following year was again carried out in 1938-39. Grants, loans and the cost of some equipment aids, including emergent grants to enable fishermen in the Maritime Provinces to replace gear which had been destroyed in some exceptionally severe storms, totalled \$471,106.20 during 1938-39. Of this total \$369,443.57 was contributed from the funds of the Department of Fisheries. The remainder of the money was contributed, in varying shares, by co-operating provinces—Nova Scotia, New Brunswick, Prince Edward Island and Quebec—under respective agreements made by them with the department.

Leaving out of the reckoning those fishermen who were aided by means of the emergent "storm grants," 14,308 fishermen and 36 associations of fishermen in the Maritime Provinces and Quebec received direct financial assistance in the total amount of \$386,424.38, and \$295,732.98 of this total was contributed by the department. Shown by provinces, the numbers of individual fishermen and associations receiving aid, and the aggregate sums they received, were as follows:—

NOVA SCOTIA	
Fishermen obtaining loans or other assistance.. . . .	1,050
Associations obtaining loans.. . . .	13
Total amount of loans.. . . .	\$70,614 24
Contributed by department toward total.. . . .	48,808 57
NEW BRUNSWICK	
Fishermen obtaining loans or other assistance.. . . .	3,163
Association obtaining a loan.. . . .	1
Total amount of loans and other aid.. . . .	\$71,864 70
Contributed by department toward total.. . . .	47,909 80
PRINCE EDWARD ISLAND	
Fishermen receiving loans.. . . .	1,212
Associations receiving loans.. . . .	22
Total amount of loans and other aid.. . . .	\$89,219 66
Contributed by department toward total.. . . .	59,479 77
QUEBEC*	
Fishermen receiving loans or other assistance.. . . .	8,883
Total amount of loans, etc.. . . .	\$147,438 13
Contributed by department toward total.. . . .	139,634 84

*The fishermen receiving aid in Quebec were men in the Magdalen Islands and in Bonaventure, Gaspé, Matane and Saguenay counties.

It was in the Maritime Provinces that the great damage was done to fishing equipment by severe storms in the latter part of 1938 and it was there that the department granted some special financial aid for the specific purpose of assisting the fishermen to replace the gear that was destroyed. Each of the three provincial governments also contributed to replacement costs. In New Brunswick the departmental contribution amounted to \$4,404.36. In Prince Edward Island the department paid \$19,206.23. In the case of Nova Scotia, where the damage to gear was greatest, the department made a grant of \$50,000.

ASSISTING FISHERMEN BY SALES PROMOTION

Continuing the plan first put into effect in 1936-37 and again followed in 1937-38, the department assisted the fishermen in 1938-39 by carrying on a nation-wide publicity campaign designed to increase Canadian demand for

Canadian fish products. At the same time, and with the same object in view, the department also continued to employ lecturer-demonstrators who, by cookery demonstrations and addresses, urged the merits of Canadian fish foods upon the attention of housewives and sought thereby to expand household purchases of the fish and shellfish which the fishermen have to sell. In the course of the fiscal year the two lecturer-demonstrators then employed held demonstrations and meetings at which thousands of women, in the aggregate, were present. For the most part these employees were at work in Central Canada, where there is the greatest concentration of consuming population, but some demonstrations and meetings were held elsewhere. In general it is the department's policy to carry on this particular branch of its activity in the inland parts of the Dominion rather than in the coastal districts where most of the people may naturally be expected to be already acquainted with the value of fish foods and the methods of preparing them for the table. The lecture-demonstration programs are highly regarded by the fishing industry and representations have been made to the department that they should be extended. Under these circumstances, and since the department is itself convinced of the usefulness of this work, steps are being taken to add to the number of women employed as lecturer-demonstrators.

Except in points of detail, the publicity campaign of the year was much the same as those of the two preceding years, which had been commended by the Canadian Fisheries Association and representative people in the industry as being productive of very helpful results. Advertisements were published at frequent intervals in practically all classes of publications in all parts of the Dominion. They were so drafted as to emphasize the excellence of sea products and freshwater fish and the various forms in which the catches are marketed—fresh, frozen, canned, smoked, dried and pickled. In other words, they kept in mind the interests of the fishermen in all sections of the country and the interests of the producers of fresh and processed fish alike. Accompanying the publication of the advertisements there was large-scale distribution of a new fish cook-book, *100 Tempting Fish Recipes*, which had been prepared by the department's lecturer-demonstrators. An earlier booklet, *Any Day a Fish Day*, had already been distributed among Canadian women in large numbers. The demand for the later cook-book is significant of the widened interest in Canadian fish foods which has been created by the department's publicity campaigns.

Although the general plan followed in connection with the 1938-39 campaign was much the same as those previously pursued there were two departures which might be noted as of some importance. One was the use of radio advertising, which was broadcast over more than thirty stations under arrangements made with the Canadian Broadcasting Corporation. The other was the extension of efforts by which written and pictorial material relative to the Dominion's fisheries and fish foods was made available to different classes of Canadian publications. This latter action, in particular, proved to be of a good deal of value. It may be noted, as a matter of record, that the year's distribution of information regarding the fisheries and fish foods was more widespread than it had been at any time previously.

The parliamentary appropriation from which the costs of the publicity campaign were met had earmarked the funds for use in expanding the demand for the fishermen's products at home and abroad. Out of the sum voted, \$150,000, the department transferred \$15,000 to London for use in advertising canned salmon and lobster in the "Canada Calling" campaign which was undertaken in the interests of Canadian products generally. The remainder of the appropriation, save for a small amount, was expended within the Dominion.

FISHERIES PRODUCTS INSPECTION

Fish curing plants, canneries, various classes of fish products, and the containers used in marketing certain of these products are inspected under the authority of the Fish Inspection Act and the Meat and Canned Foods Act. Inspections are made under the Fish Inspection Act in the case of certain pickled and smoked fish, and in the case of oysters and frozen smelts, while inspections relating to fish canneries and canned products are conducted under authority of part of the Meat and Canned Foods Act. Except in the case of canned salmon the inspection is performed as part of the work of the department's regular fishery inspectors, who are prepared for this particular part of their duty by special courses of study. Since practically all of Canada's output of canned salmon is packed in British Columbia inspection of this commodity is carried out by the Canned Salmon Inspection Laboratory, established by the department for this purpose at Vancouver in 1936. The laboratory is staffed by trained chemists.

A report giving details of the inspection work carried on during 1938 under the Fish Inspection Act will be found in Appendix No. 5, while detail as to the inspection of canned salmon is treated separately in Appendix No. 6.

During 1938 inspection of canned salmon nearly 1,619,700 cases—1,619,659½ to be exact—were found eligible for certification as being of approved quality. Approximately 24,500 cases measured up to Grade B standard or, in other words, they were sound, wholesome and fit for human food, though not fully up to certificate requirements. Out of all the great quantity of canned salmon inspected less than 900 cases were found to be below Grade B standard and therefore subject to confiscation. Several thousand cases, about 6,800, contained tips and tails or minced or flaked salmon and these products are not eligible for certification under the salmon inspection regulations.

Changes in the regulations under the Fish Inspection Act early in the year extended oyster inspection to "Cup Shaped Oysters", and the grading of frozen smelts was extended to the entire coast of New Brunswick. The latter extension was made after some experience with such inspection and grading on certain parts of the east coast of the province during the previous year. In 1938 there were 160,921 boxes of frozen smelts inspected and graded as compared with 7,481 boxes during 1937. During the year fifty-six permanent officers were engaged in the inspection work, assisted by thirty-eight temporary employees, with most of the latter employed in grading smelts in New Brunswick where satisfactory results were secured.

Details of the inspections under the Fish Inspection Act will be found in Appendix No. 5, as previously mentioned, and it is not necessary to go into them here.

FISH CULTURE

Fish culture work was carried on by the department in 1938 in Nova Scotia, New Brunswick and Prince Edward Island, where the fisheries are under federal administration. Thirteen main hatcheries were in operation, one subsidiary hatchery, six rearing stations, eight salmon retaining ponds and several egg-collecting camps. Operations were concerned with the more important fresh water and anadromous food and game fishes such as Atlantic, sebago and ouananiche salmon, and speckled, brown, rainbow and salmon trout. In addition, over 1,000,000 sockeye salmon eggs were planted in Hillier creek, tributary to Maggie lake, Vancouver Island, in continuation of the stocking effort, begun in 1937, to add these waters to the sockeye reproducing area of the Barkley Sound district. The total output for 1938 slightly exceeded 33,685,000.

A detailed report on fish culture operations during the calendar year 1938 is to be found in Appendix 2.

PROGRESS OF OYSTER FARMING

Growth of the department's oyster culture program in Prince Edward Island, and preliminary development of a similar program in some parts of Nova Scotia are indicated in detail in Appendix No. 4. It is only in Prince Edward Island and Nova Scotia, and on a small strip of the New Brunswick coast where beds were transferred to federal authority for investigational and experimental purposes several years ago, that control of the oyster areas is in the hands of the department. In New Brunswick, apart from the one small section of coast, and in British Columbia, the Dominion's fourth oyster producing province, oyster areas are under the jurisdiction of the respective provincial governments.

Active development of commercial oyster culture has been under way since 1932 in Prince Edward Island where control of the oyster areas was transferred to federal authority in 1928 and where, following preliminary investigation, oyster planting was undertaken on a commercial scale by oyster "farmers" employing plans of operation suggested by the department. In 1932 the number of areas under cultivation was 26 and by 1938 it had increased to 594.

The Nova Scotia Government transferred the oyster areas in that province to Dominion control in 1936, and investigation work preparatory to an effort to increase production of oysters in these waters is now under way. Two areas are under active study and approval was given during the year to 30 applications for leases by persons wishing to undertake oyster farming in the Bras d'Or Lake region in Cape Breton. A similar number of leases issued by the provincial government before transfer of control are still in force. Approval was also given in 1938 to a smaller number of leases on the Gulf of St. Lawrence coast of the province. Additional applications have been received and are under examination.

A glance at some of the tables in Appendix No. 4 will show further progress made in Prince Edward Island during the year. As already stated, the total number of "oyster farms" in operation during 1938 was 594 and they had an acreage of 2,130 acres. This represented an increase of 131 farms over the 1937 number and an increase in acreage of some 440 acres.

Though wisely paying more attention to the building up of stock on the beds than the pushing of immediate sales, nevertheless the farmers are gradually expanding their sales. In 1938 the "oyster farms" marketed 4,300 barrels of oysters compared to some 1,950 barrels in 1937. The careful building up of the stock is being undertaken in an effort to permit a much larger quantity of oysters being marketed a few years hence. In 1938 the oyster farmers planted 9,620 barrels of oysters on their "underwater farms", as against 5,175 barrels in the year preceding.

FISHING BOUNTY PAYMENTS

Payment of fishing bounties under authority of "An Act to Encourage Development of Sea Fisheries and Building of Fishing Vessels," reached a total for the year of \$159,982.70. Owners of fishing boats and vessels and fishermen in Prince Edward Island received \$14,991.05, in New Brunswick similar groups received \$21,344.60, in Quebec, \$41,784.10, and in Nova Scotia \$81,862.95. In all the number of boat owners receiving bounty numbered 11,660, while the number of vessel owners was 734. Boat fishermen receiving the bounty numbered in total 19,933, and vessel fishermen 3,707.

The basis of distribution for 1938 was as follows: (1) To owners of vessels entitled to receive bounty, \$1 per registered ton, payment to the owner of any one vessel not to exceed \$80; (2) to vessel fishermen entitled to receive bounty, \$6 each; (3) to owners of boats measuring not less than 12-foot keel, \$1 per boat; (4) to boat fishermen entitled to receive bounty, \$5.55 each.

The following table shows the distribution of bounty, by counties, in the four provinces affected:—

1938-39

Province and County	Boats	Men	Amount	Vessels	Tons	Average Tons	Men	Amount	Total Amount
			\$ cts.					\$ cts.	\$ cts.
<i>Nova Scotia—</i>									
Annapolis.....	174	270	1,672 50	5	105	20	33	303 00	1,975 50
Antigonish.....	226	343	2,129 65						2,129 65
Cape Breton.....	553	758	6,006 80	40	616	15	196	1,804 30	7,811 10
Cumberland.....	5	5	32 75						32 75
Digby.....	413	724	4,431 20	21	304	15	73	742 00	5,173 20
Guysboro.....	618	1,008	6,212 40	40	541	14	146	1,417 00	7,629 40
Halifax.....	926	1,253	7,880 15	46	620	14	190	1,760 00	9,640 15
Inverness.....	240	570	3,403 50	3	39	13	14	123 00	3,526 50
Kings.....	71	93	587 15						587 15
Lunenburg.....	640	799	5,074 45	77	3,623	47	1,090	10,163 00	15,237 45
Pictou.....	31	49	302 95						302 95
Queens.....	203	329	2,028 95	14	184	13	63	562 00	2,590 95
Richmond.....	309	505	3,111 75	81	981	12	226	2,337 00	5,448 75
Shelburne.....	793	1,287	7,935 85	86	1,628	19	489	4,562 00	12,497 85
Victoria.....	306	435	2,720 25	13	185	14	46	461 00	3,181 25
Yarmouth.....	158	337	2,028 35	56	816	15	209	2,070 00	4,098 35
Totals.....	5,666	8,765	55,558 65	482	9,642	20	2,775	26,304 30	81,862 95
<i>New Brunswick—</i>									
Charlotte.....	303	551	3,361 05	6	69	11	16	165 00	3,526 05
Gloucester.....	602	1,078	6,713 65	165	2,781	17	640	6,621 00	13,334 65
Kent.....	236	411	2,517 05	9	96	11	25	246 00	2,763 05
Northumberland.....	30	48	296 40	15	158	10	27	320 00	616 40
Restigouche.....	3	6	36 30						36 30
Saint John.....	28	43	265 65						265 65
Westmoreland.....	81	130	802 50						802 50
Totals.....	1,283	2,267	13,992 60	195	3,104	16	708	7,352 00	21,344 60
<i>Prince Edward Island—</i>									
Kings.....	183	258	1,614 90	1	10	10	3	28 00	1,642 90
Prince.....	793	1,487	9,221 35	4	58	14	12	130 00	9,351 35
Queens.....	350	631	3,979 80	1	11	11	1	17 00	3,996 80
Totals.....	1,326	2,376	14,816 05	6	79	13	16	175 00	14,991 05
<i>Quebec—</i>									
Bonaventure.....	458	857	5,251 20	12	124	10	43	382 00	5,633 20
Gaspe.....	2,278	4,511	27,516 55	39	439	11	165	1,429 00	28,945 55
Matane.....	107	175	1,078 25						1,078 25
Saguenay.....	542	982	6,127 10						6,127 10
Totals.....	3,385	6,525	39,973 10	51	563	11	208	1,811 00	41,784 10
Grand Totals.....	11,660	19,933	124,340 40	734	13,388	18	3,707	35,642 30	159,982 70

NOTE.—A number of "Late" claims amounting in all to \$5,193.50, which are included in this statement, are for the season of 1937. As the basis of distribution for 1937 differed from that of 1938, a number of the figures in the "Amount" columns do not, therefore, balance with the number of claims paid.

PELAGIC SEALING RETURNS

Delivered to the Canadian authorities by the United States Government under the terms of the Pelagic Sealing Treaty of 1911, Canada's share of the fur seal skins taken on the Pribilof Island rookeries in 1938 amounted to 8,755 skins. This represented a slight increase over the return to Canada in 1937, which totalled 8,277 skins. The Dominion's share of the skins from the Pribilof Island rookeries, as set by the treaty, is fifteen per cent in number and value of the total annual take.

The Pribilof seal herds, reduced to less than 150,000 at the time when the treaty became effective, have shown an increase of ten fold and more under the

protection given them since 1911. In August, 1938, the herd total, as estimated by the United States authorities, reached nearly 1,900,000 seals.

In recent years the plan for the disposal of the Canadian share of the seal skins has provided for the marketing of the pelts in London. Previously, the Dominion did not concern itself directly with marketing, the sales of all Pribilof pelts being carried out by the United States authorities who paid Canada fifteen per cent of the amount received. The decision reached by the Dominion authorities in 1933 to sell the Canadian share of the skins in London brought very satisfactory results at first. During the past two years, however, a new situation has arisen in that the market in London has been less favourable, both as to price and demand for sealskins generally. In 1938-39 Canada sold 5,259 skins at the London fur auctions, securing a net return of \$38,371.60, but that was less by \$6,000, in round figures, than the net amount received in 1937-38. There was only a slight decrease, less than a hundred, in the number of skins sold, as compared with the figures for the preceding year, but the return per skin decreased quite sharply.

In addition to her share of the Pribilof Island skins, Canada is also entitled, under the Pelagic Sealing Treaty, to a ten per cent annual share of the pelts taken on Japanese and Russian rookeries. In 1938-39 Japan paid Canada \$983.57 as the proceeds from the sale of 214 skins.

INSTRUCTIONAL WORK AMONG FISHERMEN

Continuation and extension of special work among the fishermen in a number of Atlantic Coast areas was a major part of the educational program carried on by the department during the past year. Conducted for the department by adult education specialists from St. Francis Xavier University, this work is designed to assist fishermen in studying their problems and in organizing for joint action to solve those problems. It is carried on in areas where, for one reason or another, there are local conditions which place the fishermen in need of assistance of this kind.

The work was begun in some fishing communities in northeastern New Brunswick in 1936-7. Subsequently, it was extended to the Magdalen Islands, the only part of Quebec where the fisheries are under federal administration. In the course of 1938-9 it was extended also to Prince Edward Island districts as well as to Cape Breton Island and some other parts of Nova Scotia. Under the plan which is followed by adult education workers the fishermen are helped to organize and conduct study clubs, to form associations which usually affiliate with the United Maritime Fishermen—an organization of commercial fishermen of the Maritime Provinces and the Magdalen Islands—and, where they desire to do so, to establish co-operative groups. Since the work was first undertaken a number of groups in the areas covered have taken up co-operative lobster canning and have also entered into some other co-operative activities.

The expense to the department in connection with this special educational work is the actual cost only. During 1938-9 the outlay was slightly less than \$27,400. It is planned to continue the work during 1939-40. The question of giving financial assistance toward the development of broadly similar work in some British Columbia areas is receiving attention.

The past year also saw the continuation of instructional work among fishermen in certain branches of fish processing. Reference to this subject will be found in Appendix No. 5. The same appendix deals in some detail with educational courses for fishermen given by the Fisheries Research Board. All of the investigations and experiments carried on by the board are undertaken, of course, to serve the interests of the fishermen and the fishing industry generally; the research work of the past year is not dealt with here since it is reviewed in the board's own annual report.

PACIFIC HALIBUT COMMISSION

During the year the International Fisheries Commission continued its investigation of the life history of the Pacific halibut and the observation and regulation of the halibut fishery, as provided in the treaty of January, 1937, between Canada and the United States. The investigations indicated that the stocks of halibut were continuing to increase as a result of regulation.

Regulations governing fishing in 1938 were similar to those issued in August of the preceding year, in most respects. They again provided for the closure of Area 2 by means of a last date of fishing and for the closure of Area 3 by a last date of clearance for fishing and a subsequent last date of fishing. They continued the provision for the retention and landing of a limited proportion of halibut caught incidentally to fishing for other species with set lines in areas closed to halibut fishing. They changed the previous regulations by increasing the catch limits in Areas 2 and 3 by one million pounds each, to 22,700,000 and 25,300,000 pounds respectively, and by prohibiting the use of set nets for the capture of halibut.

The 1938 halibut fishing season opened on April 1, sixteen days later than in 1937. In spite of the later opening date and the increased quotas, the catch limits were attained and Area 2 was closed to halibut fishing upon the same date as in 1937 and Area 3 only ten days later than in the previous year. Areas 1 and 2 were closed to halibut fishing at midnight of July 28, with catches of approximately 706,000 and 22,923,000 pounds respectively. September 29 was set as the last date of clearance for Area 3, and the area was closed to fishing at midnight of October 29, with a catch taken of approximately 25,591,000 pounds. No halibut were landed from Area 4 which was closed at the same time as Area 3.

Permits for the retention and sale of a limited proportion of halibut caught incidentally to fishing for other species in Areas 1 and 2 after closure to halibut fishing were granted until October 17 and were valid until midnight of October 29. Under this provision of the regulations, designed to avoid wastage of halibut caught incidentally by the cod fishery, approximately 280,000 pounds of halibut were landed from Area 2.

Close contact with the fishing industry, which has contributed greatly to the success of the commission, was maintained as in previous years. On December 9 at Seattle, the commission met with the Conference Board, composed of representatives of the fishing fleets in the different ports, to give the fishermen an opportunity of presenting their views on matters pertaining to the regulation of the fishery. During the year many fishermen also availed themselves of the commission's standing invitation to visit its laboratory and to learn at first hand the results of the investigations and the scientific basis underlying every action of the commission.

The scientific investigations of the commission were continued along the lines required for the fulfilment of the purposes of the treaty. Current biological and statistical data, which form a system of observation of changes occurring as a result of regulation and a necessary basis for the continued rational control of the fishery, were collected and analyzed. The collection of biological data at sea made the operation of a vessel necessary.

Improvement in the condition of the stocks of halibut was revealed by the investigations. The abundance of fish, as indicated by the catch in pounds per unit of gear fished, showed a further increase all along the coast. The average catch per unit of gear in Area 2, which includes the grounds off British Columbia, was 70 pounds, nine pounds or fifteen per cent greater than in 1937 and 35 pounds or 100 per cent greater than in 1930. West of Cape Spencer, Alaska, in Area 3, the catch per unit of gear was 115.5 pounds—three and one-half pounds or three per cent greater than in 1937 and 50 pounds or 77 per cent greater than in 1930, the last year of unrestricted fishing.

Sampling of the stocks of marketable halibut by means of market measurements was continued to determine the changes occurring in their composition as a result of regulation. Approximately 75,000 fish were measured from 73 representative trips landed at Seattle from different banks. Otoliths for the study of age composition were taken simultaneously. Analysis of the measurements failed to produce conclusive evidence of any further increase in the average size of the fish or in the proportion of larger and therefore of mature fish on the more depleted southern banks. The maximum proportion of larger sizes from the stock of young available at the time regulation began appears to have been reached and a further increase in the larger sizes may not occur until the increasing stock of young has had time to grow up. The possibility of such an eventuality was foreseen by the commission and is to be regarded as a normal stage in the rebuilding of the spawning stocks on the southern grounds.

The work of following the effect of regulations upon the production of spawn in Area 2 was again given special attention. The halibut schooner *Eagle* was chartered and operated in the vicinity of Cape St. James spawning grounds as representative of Area 2 from December 26, 1937, to March 6, 1938, and from December 2, 1938, on into 1939. During the 1937-38 winter season, 309 quantitative net hauls were made at 114 stations in the neighbourhood of Cape St. James. At 12 of these stations hydrographic samples and data were also taken to determine the exact conditions prevailing where the eggs and larvae were found. In the 1938-39 season, 66 net stations and 3 hydrographic stations were occupied before the end of the year.

Analysis of the catches of eggs and larvae during the 1937-38 spawning season indicated that the production of spawn was somewhat less than in the winter of 1936-37, though still greater than in the 1935-36 season. Variation from year to year in the production of spawn by marine fishes is the rule and the failure of production in 1937-38 to equal that of 1936-37 is less significant than is the maintenance of the increase over 1935-36. Excepting 1938-39, about which information is not yet available, the trend of production of spawn has been definitely upward from 1934-35.

The investigations of the commission proved that the condition of the different stocks of halibut was still improving as a result of regulation. They continued to measure the changes taking place in the stocks and to explain them.

The personnel of the commission during the year remained unchanged as follows:—

For Canada—Lewis W. Patmore, Prince Rupert, B.C., and A. J. Whitmore, Department of Fisheries, Ottawa.

For the United States—Edward W. Allen, Seattle, Wash., and Frank T. Bell, Washington, D.C.

Mr. Allen is the chairman of the commission and Mr. Patmore the secretary. Headquarters of the commission are at Seattle.

PACIFIC SOCKEYE SALMON COMMISSION

Established in 1937 following exchange of ratifications of the convention which had been signed by Canada and United States in 1930 for the protection, preservation and extension of the sockeye salmon fisheries of the Fraser River system, the International Pacific Salmon Fisheries Commission made substantial progress during 1938 in preliminary and experimental investigational work. Charged with the duty of making "a thorough investigation into the natural history of the Fraser river sockeye salmon, hatchery methods, spawning ground conditions and other related matters," the commission was concerned in large part during the year with efforts to determine facts on which it could base a permanent program. Branches of this endeavour included a study of the sockeye "races" or "runs" in order to secure data as to the times of passage

of particular races through the commercial fishing grounds, the time spent en route to the river, and the time spent on the spawning grounds. The intensity of the fishery was also studied, as were the question as to the proportions of the catch taken by the several types of fishing gear and the further question as to the times of migration of the salmon to the various parts of the river system. Mapping of spawning grounds and an investigation preliminary to the study of the control of predatory fishes were likewise undertaken by the commission's staff.

Investigation and Surveys.—In the course of the year, 5,695 sockeye salmon were tagged at various points along the generally recognized migration route, including the entrance to Juan de Fuca straits, the mouth of the Fraser and Hell's Gate canyon. Of these tagged fish 2,295 were later recovered. The high percentage of recovery was most gratifying and the data made available by this particular branch of the year's investigations should prove a valuable nucleus.

Nearly 800,000 fish, or slightly more than half of the number of sockeye taken in the commercial fishing region of the convention waters, were examined by observers at canning plants which were located at points which are strategic in relation to the commission's work. Details as to age, size, sex, etc., were obtained so far as 10,000 of these salmon were concerned.

Field parties in the upper river spawning areas surveyed the important streams and made estimates of the number of spawning fish returning to them. Spawning grounds were mapped, obstacles and stream conditions observed and data (scales, measurements, etc.) were collected for use in distinguishing the various races.

At Cultus lake experiments were conducted in methods of estimating the number of spawning salmon present on the beds. The purpose of these experiments was to determine the possibility of devising and applying some relatively simple and accurate means of estimating runs to less accessible points.

Sittings of the commission were held at Vancouver on September 22, 23 and 24, 1938. In the course of these sessions the initial meeting with the Advisory Committee took place. The committee is composed of representatives of various salmon interests in the two countries. At the joint sitting the program of the commission and the work undertaken up to that time were discussed with the committee.

During the year Dr. W. A. Found, formerly Deputy Minister of Fisheries for Canada, retired from the commission. His place as one of the Canadian representatives was taken by Mr. A. J. Whitmore, of the Department of Fisheries.

NORTH AMERICAN COUNCIL ON FISHERY INVESTIGATIONS

The principal fisheries of international importance on the North American side of the North Atlantic have been for some years under investigation by the several countries interested in them. These countries have representatives on the North American Council on Fishery Investigations which has the function of correlating the investigations to mutual benefit and of making recommendations to the governments of the countries.

The council held its 25th meeting in Boston on October 4, 5 and 6, 1938. France had expected to be represented, but conflict of dates of meetings made it impossible for Dr. Ed. Le Danois to attend. Newfoundland was represented by Dr. W. F. Hampton, of the Fishery Research Laboratory. Members of the council representing the United States were the chairman, Dr. H. B. Bigelow, Director of the Woods Hole Oceanographic Institution, and Mr. Elmer Higgins, Chief of the Division of Scientific Enquiry in the Bureau of Fisheries. The three Canadian members were in attendance, namely, Dr. W. A. Found, Deputy Minister of Fisheries, Professor J. P. McMurrich (since deceased) of the Fisheries Research Board, and Dr. A. G. Huntsman, Consulting Director of the Fisheries Research Board, who has been secretary of the council for many

years. There were nine fishery investigators as advisers for the United States, and five advisers for Canada. The meeting was arranged to coincide with other fishery meetings at Boston to introduce a new feature, a general session to which the members of the Advisory Committee of the United States Bureau of Fisheries were invited and at which were presented various papers reviewing for the general fishery public the more striking results obtained in the different investigations. At the close of the meeting new officers were elected. Dr. Huntsman as chairman and Mr. Higgins as secretary.

Some of the more important investigations reported were as follows:—

Codfish.—The codfish are in large quantity and more generally fished, and hence of most general interest. They have been found to exist in more or less local populations showing quite complicated movements. The populations intergrade in character, and are distinguished principally by the average numbers of vertebrae in the backbone, which are evidently determined by the temperatures to which the eggs are exposed at an early stage in their development. Those fish found inshore in the summer move for the most part merely somewhat offshore in the winter, but some of them travel far, and chiefly north-eastward, as from the coast of Maine to eastern Nova Scotia or from outer Nova Scotia to Newfoundland. Those found in deeper water move farther offshore in the winter. Those on offshore banks show a somewhat regular, extended movement to Gaspé, the south coast of Newfoundland and the Grand bank by late summer when the water is warmest, and to the outer banks off Halifax as far as Emerald bank in the late winter when the water is coldest. There are quite peculiar cod that spawn in autumn near Halifax, and the few of them that have been tagged showed a movement after spawning the reverse of the others, not at all eastward, but westward to the gulf of Maine and bay of Fundy.

The inshore cod are fished more intensively, from ten to thirty per cent being recaptured, but only from three to five per cent of the offshore fish are recaptured.

Hydrographic Conditions.—The hydrographic conditions which affect the fish off the Canadian coast are the result to a great extent of general oceanic movements. The United States Coast Guard studies in its Ice Patrol the Labrador Current and the Gulf Stream in the vicinity of the Grand banks, and the Woods Hole Oceanographic Institution, with the co-operation of the Bermuda Biological Station and the Fisheries Research Board of Canada, is studying the ocean circulation of which the powerful Gulf Stream is the most pronounced feature and very significant for our waters. Various factors made the waters off the Canadian coast only slightly above normal in temperature during the summer of 1938.

Salmon.—Comprehensive investigation of the movements of salmon has been effected during the last two years by the Quebec Salmon Commission with the co-operation of the Governments of Newfoundland and Canada. A total of 897 salmon were tagged on the three coasts of Newfoundland, 709 in the gulf of St. Lawrence from the Miramichi region to Seven Islands, and 300 in the bay of Fundy in the outflow of the Saint John river. As in 1937, there was scattering from every point in both directions coastwise, but from Port-aux-Basques, Newfoundland, and from Seven Islands, Quebec, the salmon scattered widely, going both outwards and inwards and crossing to the south side of the gulf. In marked contrast the salmon of the Saint John outflow remained therein, with a single exception among the 172 recaptured.

Lobsters.—For the first time the council reviewed lobster investigations in which both Canada and Newfoundland are now engaged. During their first four stages the young lobsters swim up in the water and are found to be moved about by wind currents. How far they may be carried and scattered remains to be determined.

J. J. COWIE,
Acting Deputy Minister of Fisheries.

APPENDIX No. 1

ANNUAL REPORTS OF CHIEF SUPERVISORS OF FISHERIES
FOR THE YEAR 1938REPORT OF MAJOR H. D. SUTHERLAND, CHIEF SUPERVISOR OF
FISHERIES, EASTERN DIVISION

Total landings of all species of fish taken in the division during the year were greater than in 1937 by over 8,952,000 pounds, but owing to lower prices being received by the fishermen, particularly for lobsters, the landed value decreased by approximately \$927,195. The market value of \$14,091,504 reflects the lower prices and is \$881,629 below that for the previous year. The increase in production was due to larger landings in Nova Scotia, Prince Edward Island and the Magdalen Islands, offset in part by a decrease in the New Brunswick catch. The varieties showing increases in catch in excess of 1,000,000 pounds were: cod, a gain of 9,710,800 pounds; sardines, 5,113,400 pounds; mackerel, 4,442,600 pounds; herring, 4,260,100 pounds; hake and cusk, 3,234,800 pounds; and alewives, 2,957,200 pounds. The largest single decrease was in the case of pollock, a drop of 13,851,000 pounds.

The total production from the sea fisheries was 465,034,800 pounds, as compared with 456,082,800 pounds with a landed value of \$8,932,674 in 1937. The catch was 7,336,300 pounds less than in 1936 when 472,371,100 pounds were taken.

The approximate total quantities and marketed value of the fish and shell-fish produced in the division for the past six years were:—

	Production	Marketed Value
	lbs.	\$
1938.....	465,034,800	14,091,504
1937.....	455,000,000	14,945,696
1936.....	472,000,000	14,764,797
1935.....	419,000,000	13,081,989
1934.....	422,000,000	12,786,565
1933.....	390,000,000	10,205,397

THE LOBSTER FISHERY

A small increase in the catch of lobsters took place during the year; there had also been an increase in 1937. Landings in Cape Breton Island in 1938 were slightly higher than in 1937 and with a large increase in Prince Edward Island were sufficient to offset the decreases occurring in other districts, which, however, were not great. With such intensive fishing in areas where no size limit is enforced, any considerable increase in catch of this species is perhaps scarcely likely. The increased catch in the eastern district of New Brunswick in 1937 was not continued in 1938 in the newly defined areas, a small decrease being noted.

The total catch for the division was 31,227,300 pounds, with landed value of \$2,844,320 as compared with 30,708,900 pounds and landed value of \$3,719,234 in 1937. The number of fishermen engaging in lobster fishing during the year was 17,845, a decrease of 987 from the total for the preceding year.

A summary of the number of fishermen and the catch of lobsters for the past six years is shown below:—

	Fishermen Licensed	Catch Pounds
1938.....	17,847	31,227,300
1937.....	18,832	30,708,900
1936.....	18,551	28,057,200
1935.....	18,146	31,725,000
1934.....	17,968	35,658,800
1933.....	17,348	37,012,100

The catch in Nova Scotia for the year was 355,600 pounds less than in 1937. The only increase in this province was in Cape Breton. In the eastern mainland district there was little difference from the previous year and on the western mainland small decreases occurred throughout, with the exception of Lunenburg county. The lower catch in this latter section was due to the heavy loss of lobster gear when a storm on December 6-7 destroyed a large part of the traps and was followed by broken stormy weather during the remainder of the month.

The catch in New Brunswick shows a decrease of 411,200 pounds compared with that of 1937. Both the eastern section of the province and the Bay of Fundy areas had decreased landings. Lower prices to the fishermen were a contributing cause to the smaller catch in the eastern part and the heavy loss of gear in the Bay of Fundy waters during early December caused a smaller catch in that area.

Landings in Prince Edward Island were the largest for the past three years, and show the substantial increase of 1,297,500 pounds over 1937, the amounts taken each year being:—

1938.....	7,121,300 pounds
1937.....	5,823,800 "
1936.....	5,928,600 "

Lobsters were taken in larger quantities in all sections of the island but particularly in west Prince county in the vicinity of Alberton. The larger catch there is attributed to the suppression of the illegal fishing which was so prevalent in previous years. Some losses occurred in shipping market lobsters in the fall fishing period on the west coast, owing to warm weather at the opening of the season on August 10.

Little change occurred in the catch of the Magdalen Islands but it was slightly below that for 1937.

Prices paid for both canning and market lobsters to the fishermen were definitely below 1937 figures and caused a decrease of \$874,914 in the landed value for the division as a whole.

A total of 213 lobster canneries were operated in 1938, twenty-five less than in 1937. The total pack was 91,746 48-pound cases, compared with 88,181 cases packed in 1937, an increase of 3,565.

(A statement of the catch, pack, shell shipments and meat produced is given on pages 8 and 9.)

THE COD FISHERY

Increased landings of cod were made in all parts of Nova Scotia, particularly in Cape Breton Island and the western mainland, the gain amounting to 9,847,300 pounds. There was a small increase in the amount taken by the bank fishermen and salted for drying but the major part of the increase was used fresh and marketed by the fish companies. Prices were below those paid in

1937, causing a decrease in the total landed value. Larger catches were made also in Prince Edward Island and the Magdalens, New Brunswick landings alone being lower than in 1937. The loss of the European market for Gaspé cured dried fish has not been overcome by securing an outlet elsewhere and has caused a serious decline in cod fishing in northern New Brunswick.

The total quantity of cod taken during the year was 141,358,300 pounds, compared to 131,647,500 pounds in 1937, and the landed value was \$1,712,723 as against \$1,733,372 in 1937. Marketed value in 1938 was \$3,108,919, compared with \$2,719,585 in the year before.

THE SARDINE FISHERY

An increase in catch of 5,113,400 pounds was shown in the important sardine fishery although the landings were less than in the peak year, 1936. Prices obtained for the first of the catch were low, the American packers offering only \$5 to \$9 per hoghead. Later, when a scarcity became evident, the prices increased sharply, going as high as \$53 per hoghead for a choice run of fish. Landed value total increased by \$130,342. There were 349,887 cases of sardines packed by the Canadian firms and as a high standard of production has been maintained these goods find a ready market.

The quantities of sardines taken and the cases produced in the past six years were:—

	Catch	Number of Cases
	lbs.	
1938.....	36,881,800	349,887
1937.....	31,768,400	423,043
1936.....	49,273,600	393,854
1935.....	37,499,800	338,456
1934.....	33,231,000	288,091
1933.....	26,022,400	180,597

THE HADDOCK FISHERY

There was a small increase, 515,600 pounds, in the total divisional catch of haddock. In Nova Scotia, where the major part of the production occurs, the landings decreased in Cape Breton Island and the eastern mainland but there was an increase in the western part of the province. The landed value was lower but by less than a thousand dollars, than in 1937. The catch in the Bay of Fundy area of New Brunswick increased greatly over the previous year, rising from 198,900 pounds in 1937 to 887,300 pounds in 1938; the catch for 1937, however, had been exceptionally low.

The total quantity of haddock taken in the division was 39,322,400 pounds with landed value of \$634,976 compared with 38,806,800 pounds and landed value of \$635,949 in 1937. Marketed values for the respective years were \$1,334,144 and \$1,294,091.

THE HERRING FISHERY

Larger catches of herring were made in all districts except the Bay of Fundy area in New Brunswick, and in Prince Edward Island. The bulk of the catch was made up of spring fish used mainly for bait. Owing to the smaller supply of fish available in southern New Brunswick the smoked herring producers at Grand Manan did not process as large a quantity as in the previous year. Their pack was again disposed of by the Smoked Herring Board. Production of canned herring was slightly greater than in 1937 and the quantity of salt barrelled herring produced, most of it in Nova Scotia, was almost double

the preceding year's output. Landings of herring in the division totalled 86,234,700 pounds. Their value, landed, was \$410,147 as against \$336,687 for the 81,974,600 pounds caught in 1937. Marketed value in 1938 was \$1,155,460; in 1937 it was \$906,224.

THE MACKEREL FISHERY

Mackerel landings show an increase of 4,442,600 pounds over 1937, the catch increasing quite sharply in Nova Scotia but decreasing in New Brunswick and Prince Edward Island. The catch consisted mainly of spring fish and was salted for southern markets. The catch of fat fall mackerel was about the same as in the previous year but prices paid to the fishermen were somewhat lower. The marketing of the fat mackerel as salted fillets is becoming more general each year and appears to be the form most acceptable to the trade.

The total catch for the division was 28,081,900 pounds, with landed value of \$337,821, compared with 23,639,300 pounds and landed value of \$378,931 in 1937. The marketed value in 1938 was \$551,494 while in 1937 it was \$629,755.

THE SMELT FISHERY

For the division as a whole the catch of smelts increased slightly over that of the previous year. With the exception of the eastern mainland of Nova Scotia, all districts show increases, the largest being in the western Nova Scotia area. On the east coast of New Brunswick the catch increased by 70,000 pounds but fell considerably short of the quantity taken there in 1936; prices to the fishermen there were somewhat lower than in 1937, owing to a fairly heavy carry-over from the previous year and mild weather for freezing early in the season. Standard grading of frozen smelts was made effective by regulation and considerably improved marketing conditions on the east coast of New Brunswick.

The total smelt catch for the division was 6,064,700 pounds with landed value of \$286,739; the 1937 figures were 5,871,500 pounds and \$280,406. Marketed value in 1938 was \$422,080 as against \$394,326 in 1937.

THE SALMON FISHERY

Commercial catch of salmon in the division was 164,600 pounds less than 1937, the only area to show an increase being Cape Breton Island. The area showing the greatest decline was the Bay of Fundy section of New Brunswick.

Total landings for the division were 1,864,800 pounds. The landed values were \$265,301 and \$284,233 and the marketed values \$335,428 and \$330,216 for 1938 and 1937 respectively.

THE HALIBUT FISHERY

Landings of halibut in the division were 3,968,300 pounds and their landed value \$363,326, as against 3,168,600 pounds with a landed value of \$292,354 in 1937, an increase in catch of 799,700 pounds and in value \$70,972. Prices did not vary to any extent in the two years.

THE SCALLOP FISHERY

There was a big decrease in the number of boats engaged in the scallop fishery and the catch dropped accordingly. A total of 95,190 gallons equal to 47,595 barrels, were taken while in 1937 the fishermen had landed 183,695 gallons, equal to 91,848 barrels. Approximately half the boats did not fish during the last three months of the year and a number dropped out in the spring season. The sharp drop was caused by unsatisfactory market conditions in the United States, where the major part of the catch has been sold in other years. American boats and vessels operated on the offshore scallop areas during the

summer months and their catch depressed the price so much that the Canadian fishermen found that it did not pay to fish. This fishery, which is centered at Digby, Nova Scotia, has suffered a heavy loss from the causes noted.

The landed value of \$123,008 for the 1938 catch, as compared to \$278,894 in 1937, reflects the altered conditions. The marketed value was \$139,359 during the past year, compared with \$296,409 in 1937.

OTHER FISHERIES

The very large catch of pollock in 1937 was not repeated this year, the quantities taken being well below the earlier year's figures. The landings were 13,851,100 pounds less than last year, the decrease being mainly in New Brunswick's Bay of Fundy waters. Landed value was \$57,098, compared with \$99,122 in 1937, while marketed value was \$115,017 in 1938 and \$222,208 in 1937.

Landings of hake and cusk, which are taken principally in western Nova Scotia, show an increase of 3,234,800 pounds reaching 26,072,300 pounds with landed value of \$129,659. The market value decreased by \$481 totalling \$297,203.

The production of oysters from the public beds showed a further decrease this year. In the Bras d'Or Lakes area of Nova Scotia this drop amounted to 802 barrels, the eastern mainland showing a small increase. In Prince Edward Island increased quantities were taken in Prince county and northern Kings but these gains were offset by a large decrease in Queens county, making the provincial total 1,236 barrels below that of 1937. New Brunswick areas produced 823 barrels more than in the previous year but some difficulty was experienced in marketing this catch owing to the different grades of oysters taken.

The total landings for the division were 21,497 barrels with a landed value of \$91,438; the 1937 catch had been 22,355 barrels with landed value of \$102,552. Marketed values were \$138,167 in 1938 and \$143,880 in 1937.

The catch of swordfish, which is made entirely in Nova Scotia, decreased by 409,100 pounds as a result of the virtual failure of this fishery in Northern Victoria county and much smaller catches being taken on the mainland than in 1937. In the western part of the province the catch declined by over 300,000 pounds; however, the large catch made there in 1937 was most unusual. Total landings of swordfish were 1,092,900 pounds, with landed value of \$101,529 as against 1,502,000 pounds with a landed value of \$170,198 in 1937. Marketing conditions were not as favourable in 1938 as in the year before and the value—\$132,763 as compared with \$238,165 in 1937—reflects the price decline.

NOVA SCOTIA

Aggregate catch of fish in Nova Scotia during the year was 285,184,600 pounds, or approximately 14,876,800 pounds more than the amount taken in 1937. Landed value was lower, however, owing mainly to lower prices for lobsters. The marketed value decreased by approximately \$425,603.

All districts in the province show increased landings, the greatest gains being in the cod, mackerel, herring and halibut fisheries. There was a sharp drop in the catch of scallops. The western mainland district had the largest general increase; the increase in the eastern mainland, though smaller than in the west, was due to some extent to a market for fresh fish being made available during the fall to the inshore fishermen through the operation of a collection service. With the increased catches a small rise in the level of prices would put the industry on a prosperous basis. In the case of the four fisheries showing the largest increases the gains were:—

Cod..	9,847,300 pounds
Mackerel..	5,192,800 "
Herring..	5,444,400 "
Halibut..	824,300 "

The catch of haddock shows a small decrease for the year, the result of small landings in the eastern mainland at Halifax. The greater part of the mackerel taken were spring fish. For the fat fall mackerel the prices to the fishermen were lower than in 1937, making the landed value below that for 1937 despite the increased catch. Herring show a larger landed value than in 1937 and the marketed value is in proportion to the increased catch. As already pointed out, the scallop fishery experienced a serious decline on account of low prices in the United States' markets, resulting from scallop fishing being carried on by American vessels during the summer months. The catch was little more than half as large as in the previous year and was marketed at low prices. Only about half of the boats operated in the fall fishing season.

The commercial catch of salmon shows a small increase for the year, thanks to larger quantities being taken in Cape Breton Island.

A decrease of 355,600 pounds in the lobster catch occurred owing to smaller landings being made in the western mainland, where a heavy December storm destroyed a large part of the lobster gear shortly after it had been set. Production increased in the Cape Breton Island section while on the eastern mainland the decrease was only about 7,000 pounds. The prices, both landed and marketed, were lower than for some time. Landings in the province in the past six years have been as follows:—

1938.....	15,540,500 pounds
1937.....	15,896,100 "
1936.....	14,509,100 "
1935.....	17,683,600 "
1934.....	18,459,000 "
1933.....	17,685,800 "

The record of total catches, landed and marketed values covering the chief species taken in Nova Scotia is shown in the following statement:—

1938

Total quantity of all fish landed	lbs. 285,184,600
Landed value.....	\$ 5,323,582
Marketed value.....	\$ 8,804,231

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	15,540,500	1,770,722	2,282,169
Cod.....	119,243,800	1,507,424	2,504,847
Haddock.....	38,354,600	615,963	1,293,273
Halibut.....	3,954,400	362,203	499,175
Mackerel.....	22,796,000	274,545	447,561
Herring.....	25,565,400	167,807	407,146
Scallops (gals.).....	92,000	119,109	135,460
Swordfish.....	1,092,900	101,529	132,763
Hake and Cusk.....	16,587,000	85,999	214,205
Salmon.....	485,400	69,518	84,616
Pollock.....	8,189,200	43,695	93,761
Smelts.....	678,100	39,702	58,470
Soles.....	1,694,100	30,304	69,978
Alewives.....	3,872,300	25,499	35,294

1937

Total quantity of all fish landed	lbs. 270,307,800
Landed value.....	\$ 6,015,179
Marketed value.....	\$ 9,229,834

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	15,896,100	2,304,302	2,757,880
Cod.....	109,396,500	1,526,374	2,404,452
Haddock.....	38,504,700	628,606	1,282,023
Halibut.....	3,130,100	290,215	392,335
Mackerel.....	17,603,200	302,723	465,803
Herring.....	20,121,400	129,522	342,426
Scallops (gals.).....	180,855	274,760	201,225
Swordfish.....	1,502,000	170,198	238,165
Hake and Cusk.....	14,428,900	74,843	210,653
Salmon.....	464,700	70,304	79,389
Pollock.....	10,648,500	53,874	102,005
Smelts.....	687,200	40,246	56,842
Soles.....	2,174,900	32,333	89,950
Alewives.....	2,907,800	16,450	23,169

NEW BRUNSWICK

The total landings of fish in the province including the inland section were 127,727,600 pounds, which was a decrease as compared with the previous year of 10,608,800 pounds, due in a large measure to the greatly decreased catch of pollock. These fish were unusually plentiful in 1937 but did not make their appearance in the same abundance during the present year. Landings of this variety were 11,391,800 pounds less than in 1937. The landings of cod, lobster, herring, clams and shad were also lower, offset by a large increase in the catch of sardines of 4,359,400 pounds as well as an increase in alewives and haddock. The gain in catch of lobsters last year was not maintained as production was 411,200 pounds below that year. Landings in both the Bay of Fundy and eastern areas were lower with the price of both canning and market lobsters below 1937 figures. There was a further decrease in the catch of cod in the northern section where this fishery has had so serious a decline owing to the lack of a market for the Gaspé cure. Efforts to produce pickle-cured cod for making boneless and to market some dried cod in the United States have not yet been fruitful in any large way although some progress is being made. A considerably larger catch of sardines was made in the Bay of Fundy waters and towards the end of the run sold at high prices to the American firms. The production of herring was lower in the Bay of Fundy area and due to high prices a smaller quantity was smoked at Grand Manan; larger quantities were canned in various forms at Black Harbour. The prices were higher and compensated for the decreased catch.

The total production for the province including the inland section was 127,727,600 pounds with landed value of \$1,799,459 compared with 138,336,400 pounds with landed value of \$1,910,610 in 1937. The respective marketed values were \$3,996,064 and \$4,447,688. The catch of the inland section was 1,115,100 pounds with a landed value of \$37,271 compared with 1,158,000 pounds with landed value of \$40,333 in 1937. Marketed values were—1938, \$40,181; 1937, \$43,141.

Better catches of haddock were made than in 1937, mainly by boats fishing from Wilson Beach and were sold at good prices at Eastport, Maine.

The salmon catch was down slightly and prices remained at about the same level as for 1937.

There was a decrease of 1,305,000 pounds in the catch of clams in the Bay of Fundy area. About the same quantity was canned locally and the decrease in the catch was due to market conditions for clams in the raw state.

There was a small increase in the smelt catch of the eastern section but owing to lower prices to the fishermen the landed value decreased. The market price received was less owing to there being a heavy carry over from the previous year's catch.

The total catches of the different varieties with their landed and marketed values for New Brunswick are shown in the following tabulations:—

1938

Total quantity of all kinds.....	lbs. 127,727,600
Landed value.....	\$ 1,799,459
Marketed value.....	\$ 3,996,064

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	6,847,400	497,320	721,612
Sardines.....	36,127,800	336,826	1,389,195
Smelts.....	4,360,900	209,468	308,991
Herring.....	42,731,500	192,939	626,469
Salmon.....	1,421,000	204,045	258,994
Cod.....	10,268,300	103,548	167,322
Oysters.....	2,473,800	45,966	76,512
Clams.....	5,591,900	36,513	94,580
Alewives.....	6,095,700	34,311	76,230
Hake and Cusk.....	4,569,800	23,913	36,898
Shad.....	1,338,700	37,861	42,307
Haddock.....	917,200	18,299	39,821
Pollock.....	1,944,200	12,403	21,256
Quahaugs.....	345,100	3,328	8,981

1937

Total quantity of all kinds.....	lbs. 138,336,400
Landed value.....	\$ 1,910,610
Marketed value.....	\$ 4,447,688

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	7,258,600	713,801	1,089,002
Sardines.....	31,768,400	210,254	1,525,602
Smelts.....	4,272,000	209,672	295,296
Salmon.....	1,624,100	224,892	261,740
Herring.....	45,276,500	151,245	443,739
Cod.....	11,598,700	118,111	172,369
Oysters.....	2,309,200	51,277	75,487
Clams.....	7,200,200	46,920	114,475
Pollock.....	13,336,000	45,248	120,203
Shad.....	1,363,300	38,286	44,738
Alewives.....	4,414,900	26,120	52,015
Hake and Cusk.....	4,584,900	19,328	54,005
Mackerel.....	1,012,700	16,045	36,211
Haddock.....	261,800	6,701	10,401
Quahaugs.....	194,600	2,017	4,176

PRINCE EDWARD ISLAND

The total landings of all kinds of fish in 1938 increased over 1937 by 1,895,400 pounds. The varieties having the largest increases were lobsters, hake and cusk, and alewives. Smaller catches were made of herring and oysters than in 1937.

The lobster fishery which showed a decreased catch in 1937 in the decline from the peak of 1932 yielded a larger amount during the year of 1,297,500 pounds but owing to the lower prices obtained was not as remunerative to the fishermen by approximately \$66,000; larger catches were made in all districts. In this connection the District Supervisor writes:—

“The co-operation on the part of the fishermen to personally protect the various fishing industries, evidence of which was noted in 1937, has

increased to a gratifying extent, and although there were odd attempts to fish illegally a marked improvement was noted throughout the season in this respect, the interest of the individual fisherman being an important contributory factor to the satisfactory results obtained."

This attitude of co-operation appears to be securing results insofar as the lobster fishery is concerned.

There was not much change in the cod fishery which was about on a level with 1937, the prices remaining unchanged from those obtained the previous year. The landings at Souris increased owing to two vessels fishing from that port until December 22. Landings of herring were below 1937, the bulk of the catch taken being from the spring run and used for lobster bait, the catch of fat herring was smaller due to rough weather preventing the fishermen from operating. The mackerel catch was slightly below the previous year. A considerable increase (317,700 pounds) was made in the landings of alewives due to a demand for them as fox feed. A quantity was taken in the herring nets during August and September which was pickled and used for food. The catch of smelts was higher than in 1937 but was considerably below 1936. Owing to the grading of all smelts marketed the landed and marketed values were increased.

A further decline occurred in the oyster fishing, the public beds in Orwell, Vernon and Seal rivers and in Pownal bay and its tributaries have become affected with what appears to be the same disease as that which was evident in East and West rivers in 1937, and the amounts taken from the areas has decreased. The total catch was 1,048,400 pounds (5,242 barrels) as compared with 1,295,600 pounds (6,478 barrels) in 1937, a decrease of 247,200 pounds or 1,236 barrels. Increased landings were made in east and west Prince county and northern Kings, the decreases being in the areas noted in southern Queens county. The bulk of the shipments was from the leased areas augmented by about 500 barrels taken in Bedeque bay which had been reconditioned by relaying them in approved areas. The increased quantities from the leased areas are a tribute to the work of Dr. A. W. H. Needler, whose work in this regard has been invaluable. The depletion of the Queens county areas has been keenly felt by the fishermen there, who depended on it largely for a livelihood.

The total landings of all species with landed and marketed values were as shown below:—

1938

Total quantity of all fish landed.....	lbs.	29,420,400
Landed value.....	\$	649,074
Marketed value.....	\$	930,874

	Lbs.	Landed Value	Marketed Value
	\$	\$	\$
Lobsters.....	7,121,300	458,762	606,134
Cod.....	6,842,500	49,880	76,415
Smelts.....	960,800	34,125	50,725
Oysters.....	1,048,400	29,232	39,193
Herring.....	5,605,600	29,174	57,728
Hake and Cusk.....	4,915,500	19,747	46,100
Mackerel.....	1,055,900	16,146	25,003
Clams.....	694,200	3,471	16,072
Silversides.....	307,800	2,682	3,078
Alewives.....	484,000	2,520	4,890
Quahaugs.....	214,500	881	1,744

1937

Total quantity of all fish landed.....	lbs.	27,525,000
Landed value.....	\$	713,632
Marketed value.....	\$	870,299

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	5,823,800	524,847	538,792
Cod.....	6,750,400	49,868	88,900
Smelts.....	890,000	29,220	40,856
Oysters.....	1,295,600	32,402	44,020
Herring.....	6,492,800	35,752	66,964
Hake and Cusk.....	3,823,700	14,244	33,026
Mackerel.....	1,116,400	18,079	28,958
Clams.....	701,000	3,505	14,141
Silversides.....	137,000	1,298	1,341
Alewives.....	166,300	875	1,514
Quahaugs.....	187,400	937	3,825

MAGDALEN ISLANDS

The catch in the Magdalen Islands increased over the total for the previous year by 2,788,600 pounds, the gain being made principally in the cod and herring fisheries. Landed value, however, was lower than in 1937, a condition accounted for by the smaller prices paid for lobsters.

The lobster catch was only slightly below 1937, about 12,000 pounds below. Fewer fishermen were engaged and the number of traps decreased by approximately 35,000. Increased landings of cod were made in the southern district but fell off in the northern area owing to the closing of the plant operated by the Gorton Pew Company. A good catch of herring was made, 2,248,300 pounds in excess of 1937 landings. Increased quantities of herring were used to make smoked bloaters and 29,000 boxes more than in 1937 were produced. The catch of mackerel decreased by 465,500 pounds, smaller landings being made in both the northern and southern districts. The market price of spring and fall mackerel alike was much below that obtained in 1937.

The islands' total catch for the year and landed and marketed values were as detailed below:—

1938

Total quantity of all fish landed.....	lbs.	22,702,200
Landed value.....	\$	239,451
Marketed value.....	\$	360,335

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	1,718,100	117,516	155,917
Cod.....	5,003,700	51,871	62,983
Mackerel.....	3,441,500	34,360	57,087
Herring.....	12,332,200	20,227	64,124
Smelts.....	64,900	3,444	3,894

1937

Total quantity of all fish landed.....	lbs.	19,913,600
Landed value.....	\$	299,340
Marketed value.....	\$	425,312

	Lbs.	Landed Value	Marketed Value
		\$	\$
Lobsters.....	1,730,400	176,284	199,527
Cod.....	3,901,900	45,106	53,864
Mackerel.....	3,907,000	42,084	98,783
Herring.....	10,083,900	20,168	53,095
Smelts.....	22,300	1,268	1,338

SPORT FISHING

NOVA SCOTIA

Angling generally in Nova Scotia was retarded to some extent by weather conditions which caused unusually high water in the streams and lakes on the mainland and with a cold period in the Cape Breton section during the first six weeks of the open season, which is usually the best time for fishing in that area. The number of salmon taken was less than in 1937, a state of affairs attributed to the water levels in the streams being so high that either fish passed upstream to the headwaters where no angling was carried on or the excess water created unfavourable conditions for the fish to rise to the fly. Trout fishing was good in the mainland area and an average catch was made after the month of June in Cape Breton waters.

Angling in Cape Breton.—Angling in Cape Breton Island was definitely held back for the first six weeks of the season on account of cold weather but good fishing was obtained from July onward until the latter part of the season when rains raised the level of the water to such an extent that few fish were taken. During the summer frequent rains kept the streams at satisfactory height. Conditions on the Margaree river generally were good and more salmon were taken than in 1937, the month of September affording the best fishing. The number of salmon taken in the North river, Victoria county, was also greater than in the year before. The table below gives the number of Salmon taken by angling in 1938 and the preceding year:—

	1938	1937
Margaree river.....	488	312
North river St. Ann.....	349	309
Baddeck river.....	26	42
Grand river.....	41	40

The catch of trout was about the same as for 1937. A sharp decrease in catch occurred at Lake Ainslie, Inverness county, where only 509 were taken as compared with 2,714 in 1937. In other parts of the island, particularly northern Victoria, increased catches were made.

Angling, Eastern Mainland.—The weather conditions general in the province were found in this district. There was a good supply of water in all the streams and lakes and in some it reached too high level for good angling. In two streams only were a greater number of salmon taken than in 1937—St. Mary river, Guysboro county, and Moser river, Halifax county. The largest decrease in numbers taken was in Ingram river, Halifax county. The table below gives the number of salmon taken in the various streams for the past two years:—

	1938	1937
St. Mary river.....	441	375
Liscomb river.....	17	45
Ecum Secum river.....	48	78
Gaspereau brook.....	24	31
Isaacs and New Harbour rivers.....	20	96
Salmon river, Port Dufferin.....	64	69
Sheet Harbour rivers.....	54	65
Tangier river.....	114	246
Ship Harbour river.....	40	45
Musquodoboit river.....	100	240
Lawrencetown waters.....	80	168
Ingram river.....	174	478
Moser river.....	280	253

Trout fishing in all the lakes and streams compared favourably with that of other years and was better than in 1937. A number of trout marked before being liberated by the hatchery officers were taken in Sherbrooke lakes, Guysboro county, and showed good growth and a high rate of survival.

Angling, Western Mainland.—There was a sharp decrease in the number of salmon taken by angling in the western part of Nova Scotia, a condition which was due at least in part to the almost continuous high water conditions that prevailed and allowed salmon to ascend to the upper portions of the river fairly early in the season. The decrease in catch was general in all the principal salmon angling streams but most noticeable in the Mersey and Medway, the heaviest producers of sport fish. Trout fishing was quite satisfactory, the best angling being at the headwaters of the principal rivers where higher water conditions caused more attractive angling.

The table below gives the comparative number of salmon taken by angling in the principal rivers in the past two years:—

	1938	1937
<i>Lunenburg county—</i>		
East river.....	59	28
Middle river.....	27	50
Gold river.....	73	91
La Have river.....	125	344
Petite river.....	60	238
<i>Queens county—</i>		
Medway river.....	312	613
Mersey river.....	278	637
<i>Shelburne county—</i>		
Roseway river.....		2
Clyde river.....	18	30
<i>Yarmouth county—</i>		
Tusket river.....	20	60
<i>Digby county—</i>		
Salmon river.....	38	43
<i>Annapolis county—</i>		
Lequille river.....	19	19
Round Hill river.....	100	99
Annapolis river.....	78	139
Nictaux river.....	37	253
<i>Kings county—</i>		
Gaspereau river.....	14	48

Deep Sea Sport Fishing.—This sport continued to be an attraction for tourists and anglers during the summer months. Tuna sport fishing was very much in evidence in the coastal waters of Victoria, Lunenburg, Queens, Shelburne and Yarmouth counties, though the fish taken were somewhat smaller in size than in other years, and were rather less plentiful. Some very good fish were taken, however, the largest at Shelburne weighing 864 pounds. Swordfish were not taken in any quantity in Cape Breton waters, the weather being unfavourable for angling; the largest caught by angling weighed 295 pounds. Striped bass fishing afforded good sport at Annapolis Royal where consistent fishing was obtained during the season. Angling for pollock was not as good as in the preceding year, the fish not appearing at the surface or in the quantities that can be found on the coast as a general rule.

NEW BRUNSWICK

Bay of Fundy Area.—Angling for salmon is not at all extensive in this area, but few fish were taken in the Salmon and St. Croix rivers. Fishing for land-

locked salmon in Chamecook lakes showed an improvement and 176 fish, averaging 2½ pounds each, were taken as compared with 132 averaging 2 pounds in the previous year. Black bass fishing in Wheaton lake was also satisfactory, fine catches of large bass being taken during the summer months.

Deep Sea Sport Fishing.—Pollock were the only deep sea fish taken by angling; the catch was about 3,000 pounds taken mainly off Charlotte county.

Eastern District.—Conditions throughout the district were better for angling than in 1937 as there were frequent rains and the water in the streams was maintained at a higher level throughout the season. There was lacking also the extreme heat without rain, prevalent in August and September the previous year, which had interfered much with trout angling. Salmon angling on the Restigouche river and its tributaries was slightly better than in 1937, the total landed being 2,910 fish as compared with 2,546. On the Jacquet river 132 salmon were taken as compared with 130 in the previous year. In the Bathurst area, including Tetagouche, Middle, Little and Nipisiquit rivers, 461 salmon were landed or 142 more than in 1937. The only river in Northumberland county where salmon angling is carried on successfully is the Tabusintac and in this stream during the months of September and October 83 salmon and 27 grilse were taken as compared with 242 in the year before. The main angling in this river, however, is for spring salmon taken on a barbless hooked fly. Of these 830 were caught and immediately released. The catch for the previous year was only 392 fish.

Trout angling was carried on under excellent conditions on the larger rivers and their branches in Restigouche, Gloucester and Northumberland counties. The numerous smaller streams there also produced satisfactory angling results, more favourable water and temperature conditions being contributing factors. The streams in this group included the Eel, Charlo, Louiston, Middle, Little, Tetagouche, Nigado, Pokemouche, Tracadie, Caraquet, Bartibogue, Bay du Vin, Eskedelloe, des Caches, Burnt Church, Black and Napan rivers.

In Kent and Westmorland counties similar conditions prevailed in the principal trout fishing streams and much better trout fishing obtained than during the previous year.

Inland District.—Water and weather conditions were good and at no time did the water reach a low level during the angling season and the high water did not adversely affect angling on either side of the St. John or Miramichi.

The catch of salmon and grilse in the St. John river waters was below 1937 in number. In the Miramichi waters the number of salmon taken increased but there was a small decrease in the catch of grilse; the salmon increase was due to more fishing for black salmon, 356 permits being issued for angling with barbless hooks as against 237 in 1937. Angling for bright salmon was good during July and September.

On the Nashwaak river the catch was below 1937 total or 85 salmon and grilse compared with 132. Hartts Island pool, which last year did not give as good angling as usual, was again this year barren of fish. On the St. John river decreased numbers of fish were taken in the Hartland, Bristol and Bath pools.

On the Tobique river the catch was 806 salmon and 113 grilse; in 1937 the figures were 623 salmon and 595 grilse. Fewer salmon were taken in Salmon river than in the preceding year.

The total number of salmon and grilse taken by angling in the principal rivers was:—

—	1938		1937	
	Salmon	Grilse	Salmon	Grilse
St. John River system.....	1,146	238	1,316	1,349
Miramichi River system.....	8,253	9,549	5,192	9,818

Of these numbers the southwest Miramichi produced 6,224 salmon and 6,661 grilse, the northwest Miramichi 1,871 salmon and 2,319 grilse. Trout fishing was better than in 1937 the catch increasing by 2,500 pounds.

PRINCE EDWARD ISLAND

Angling in the ponds and brooks of Prince Edward Island was good during the early part of the season but fell off as the water became warm. Angling for sea trout was good throughout the season. Large numbers of trout were seen on the spawning grounds after the close of the fishing season.

In West Prince county during the early part of the season very fair catches of trout were taken in all the brooks and ponds, but when the warm weather came fishing became poorer. Water conditions were good for trout and salmon and there was a good run of both these fish.

In Dunk river, East Prince county, very few trout came up during the fishing season but there was an abundance of small trout. In other streams in this district the catch was about the same as in 1937.

In Northern Queens county, good runs of sea trout were noticed throughout the season in the more important streams, and fishing was good in all the mill ponds. Angling conditions were exceptionally good at the head of Hillsboro river and very good in the early part of the season at Blooming point. Fishing for rainbow trout in Glenfinnan lake was very poor.

In Southern Queens there was a good run of sea trout in all the rivers. Fishing in the mill ponds was good in the early part of the season but fell off as the water became warm. Spawning conditions were favourable. There was fairly good fishing in McRae's, McPherson's, McLeod's ponds and water and spawning conditions were favourable in all of them. There was also good fishing in Montagne, Brudenell, Sturgeon, Murray and Belle rivers. Fishing in Vernon river was poor.

In Northern Kings water and angling conditions were favourable and there was good fishing in Fortune river, Big pond, Morell river, Naufrage river, East lake and Black pond. The trout trap was not operated at Fortune river and it is difficult to make any comparison of the number of trout ascending to spawn at this place but a large number of adult female trout were taken well up stream during the closing days of the fishing season. Salmon were not as plentiful at Morell river as in 1937 only 443 being taken in the trap collecting salmon eggs; in 1937 the trap took 909. A record landing was made at Big pond during the latter part of May when a Charlottetown sportsman landed a trout weighing approximately eight and three-quarter pounds.

FISHERY PROTECTION SERVICE

The Fishery Protection vessels *Arras* and *Arleux*, the former under the command of Captain H. P. Cousins and the latter commanded by Captain R. I. Swansburg, were actively engaged in fishery protection duties along the Atlantic coast of the division throughout the year and rendered excellent service.

The *Arras* was employed from January 1 to January 20 as a mother ship with the winter fishing fleets operating from Canso, Petit de Grat, Arichat and vicinity and the services performed in this connection were very much appreciated by the fishermen of these places. Two men in a disabled Canso fishing boat were rescued on January 5 off Green island and the boat towed to port, and on the following day another disabled fishing boat was towed safely to Canso.

At the request of the Fisheries Research Board the *Arras* was lent to that board from January 22 to February 3 for the purpose of carrying out a hydrographic survey off the outer coast of Nova Scotia. From February 4 to the end of March the ship was engaged patrolling between Halifax and cape Sable as a safeguard against infringements of the lobster fishing regulations, in protect-

ing territorial waters from foreign vessels, and in breaking ice to release fishing vessels. From April 1 to April 13 patrol was carried on between Halifax and Canso. Ice was broken at Country harbour and Spanish bay for the benefit of the local fishermen. The *Arras* was laid up at Yarmouth for annual overhaul from April 18 to May 18 and patrol was then resumed between Yarmouth and Halifax.

As in former years the *Arras* was detailed for work with the fishing fleet on the Grand Banks during the summer months and left Halifax on June 14, arriving at Burin, Newfoundland, on June 17 where she found the Lunenburg fleet. While on the Grand Banks weather conditions, bait and ice reports, etc., were broadcast daily from the ship to the fleet and medical services, as required, were rendered by the ship's doctor to members of the crews of the fishing vessels. With reference to the work on the banks Captain Cousins commented as follows:—

"During the summer season 27 Lunenburg fishing vessels operated on the Grand Banks. The ship's doctor gave medical treatment 426 times. The catch by the Lunenburg fleet averaged about 2,500 to 3,000 quintals of fish per vessel, this being the most successful catch for several years.

"There were 20 French and 30 Portuguese trawlers operating on the Grand Banks and coast of Greenland."

The *Arras* left Newfoundland waters on August 27 and returned to Nova Scotia where she resumed fishery protection duties along the coast. She also assisted at the Lunenburg County Exhibition at Bridgewater and the Lunenburg Fisheries Exhibition at Lunenburg. The *Arras* accompanied and acted as a mother ship to the racing fishing schooner *Bluenose* during the International Schooner Races held off Boston and Gloucester in the fall.

Returning to Halifax the ship proceeded on November 11 to Canso to resume her duties as a mother ship with the winter fishing fleets working out of Canso, Petit de Grat and Arichat. During the year the ship spent 182 days at sea and steamed 10,802 miles.

The *Arleux*, from the opening of the year until February 8, was engaged on the southwestern coast of Nova Scotia in lobster protection work, particular attention being given to the enforcement of the size limit. Supervision was given to the movement of foreign vessels within territorial waters, while ice was broken by the ship at various points to release fishing vessels so that they might proceed to and from the fishing grounds. From February 9 to March 24 the ship was laid up at Lunenburg for annual overhaul.

On the completion of overhaul, the *Arleux* was detailed for work along the eastern coast of Nova Scotia where she was occupied until April 24 breaking ice where required as well as assisting in the enforcement of the lobster fishery regulations. As in former years the vessel was called upon to render assistance in connection with the protection of the lobster fishery in the Northumberland Strait area and was so engaged from April 25 to May 13. Finishing work in this area, the *Arleux* proceeded to Cape Breton where she was employed for two weeks measuring and locating trap-net berths at Middle Head, Ingonish and Arichat. Patrol work followed from May 27 to July 1 along the eastern and southwestern coasts of Nova Scotia and then the ship resumed work in the Northumberland strait, returning thence to patrol the Atlantic coast of Nova Scotia from July 12 to August 3. From August 4 to October 3 she patrolled the waters of Northumberland strait, enforcing the lobster fishing regulations, giving particular attention to the protection of berried lobsters, as well as checking lobster fishermen for lobster fishing licences.

From October 4 to the end of the year the *Arleux* carried on general patrol duties along the Atlantic coast of Nova Scotia, supervising the operations of

the scallop and lobster fishermen, and the enforcement of the lobster size limit regulations in lobster fishing district No. 4 after the opening of the lobster fishing season on December 1.

The *Arleux* is equipped with a fast motor boat, and this boat, working in conjunction with the mother ship, was a great factor in suppressing illegal lobster fishing. The motor boat alone covered 1,865 miles in patrol duties and was instrumental in assisting the crew of the *Arleux* to seize and destroy a considerable quantity of gear which was illegally set. During the year the *Arleux* spent 191 days at sea and steamed 9,830 miles.

FISHERIES PATROL SERVICE

NOVA SCOTIA

In Cape Breton the chartered patrol boat *Cabar Feidh* was again employed in patrolling lobster fishing district 6A from May 16 to July 16. The boat covered 936 miles checking up on licences and searching boats for undersized lobsters. The services performed were very satisfactory.

Along the eastern shore of the province the patrol boat service during the year was carried on by the patrol boat *Venning* and the patrol boat *Gilbert*, both owned by the department, and the chartered boats *Marmat*, *Daisy L.* and *Elsie*.

The *Venning* commenced patrol work on May 30 and continued until laid up for overhauling on March 15, 1939. Owing to repairs not being completed this boat was late going on duty. She proceeded to Newcastle on June 9, remaining on duty in New Brunswick until August 2, when she returned to Nova Scotia waters. After some general patrol work she was detailed to work in checking illegal lobster fishing to the eastward of the boundary of the fall lobster season in District No. 8. When this had been completed the *Venning* returned to Halifax county and was employed in the open lobster season of District No. 4. A total of 7,590 miles was covered during the year.

The *Gilbert* was put in commission on April 14 and after being employed in lobster fishing District No. 7 at the commencement of the lobster season left for bay Chaleur on May 21 and returned on July 19. She was then employed continuously on the boundary line between Districts Nos. 7 and 8 until October 6, after which she proceeded to Port Bickerton, Guysboro county, to act as mother ship to the fishing fleet at that place, laying up at Halifax on January 20, 1939. A total of 7,960 miles was covered on patrol work.

The chartered boat *Marmat* was engaged from May 3 to October 22. She was employed continuously in the strait section to oversee the operations of the nets and to check illegal lobster fishing from Malagash point to Mulgrave. A total of 4,902 miles was covered on patrol work.

The *Daisy L.* was on duty from August 8 to October 8 and covered 956 miles. The area covered was particularly at Malagash point, Wallace, Oak island and the shore of Cumberland county to McIvor's head.

The *Elsie* was engaged from August 8 to September 17 and covered a distance of 1,246 miles on patrol. This boat was used mainly in the Lobster Fishing District No. 8 to oversee the operations of the fishermen.

The C.G.S. *Arleux* patrolled in the district during three periods: June 28 to July 16; August 3 and 4; and October 3 to 6. Mileage travelled by the ship 1,119 miles, patrol by the small boat 495 miles.

The guardian on Pictou island furnished a motor boat and the guardian at Tatamagouche bay also, both of which gave effective service.

In the western district patrol boat service was rendered by the departmental owned boats *Capelin* and *A. Halkett* assisted by chartered boats at Yarmouth, Clark's harbour, Woods harbour and Chester.

The *Capelin* patrolled generally, as formerly, the waters of the Nova Scotian coast from Pubnico to the headwaters of the bay of Fundy. At the beginning of the year she was stationed at Westport, acting as a mother ship to the winter haddock fishing fleets operating in that vicinity and was also actively engaged in enforcing the lobster size limit regulations. The boat was laid up at Meteghan for annual overhaul from February 28 to May 2. Upon going into commission again she patrolled the waters of St. Mary bay, checking boats to see that undersized lobsters were returned to the water, and then made a general patrol to the headwaters of the bay of Fundy. Later a considerable period was spent in St. Mary bay and vicinity on lobster protection work. Lobster smacks, boats and cars were searched throughout the season for illegal fish. During the year twelve fishing boats and two schooners were assisted and towed to safety. Two men adrift in a dory during the storm of Demeber 5 were rescued and brought safely to Westport.

The *Capelin* patrolled 6,389 miles, destroyed 169 lobster traps, 125 buoys, 2,285 fathoms of rope illegally set and liberated 151 lobsters.

The *A. Halkett* at the opening of the year was engaged in checking up lobster fishermen's licences as well as enforcing the lobster size limit regulations and preventing the holding of berried lobsters. The boat was laid up for annual overhaul from February 28 to April 6. After going into commission she patrolled the waters of Mahone bay, enforcing the scallop fishery regulations, and worked week-ends in the estuary of the Medway river to prevent illegal salmon fishing. Assistance was rendered to the International Tuna Angling Committee at Liverpool during the latter part of August and the boat gave assistance to the Bridgewater Exhibition Committee at Bridgewater and the Nova Scotia Fisheries Exhibition Committee at Lunenburg in September. A large number of lobster fishing boats were boarded and their catches inspected and crates belonging to dealers and fishermen were overhauled to insure the enforcement of the lobster size limit regulations.

The *A. Halkett* patrolled during the season 4,964 miles, seized 74 lobster traps, 487 fathoms of rope and liberated 129 lobsters. Assistance was given to two schooners and several small boats.

The chartered boats working in the vicinity of Yarmouth, Clark harbour, Woods harbour and Chester gave satisfactory service and the work performed by them was instrumental in keeping down illegal lobster fishing.

NEW BRUNSWICK

In the Bay of Fundy section of the province the usual patrol boat service was carried on during the year. The *Gannet Rock II*, a fine fast new boat, operated at Grand Manan during the entire year, covering 6,537 miles. As a result of the effective work that was performed by this boat there was practically no attempt at illegal lobster fishing at Grand Manan. The other regulations were also well observed as a result of this effective patrol.

The *Thresher* was in commission all the year and covered 10,707 miles. The *Thresher* is the general patrol boat for the whole Bay of Fundy district and was very helpful in attending to disabled motor fishing boats and in bringing doctors to needy sick persons on the islands and taking them to hospitals for medical treatment.

Two small chartered boats were also employed. One operated in Maces bay and the other at Grand Manan. The services rendered were satisfactory and they were instrumental in suppressing attempts at illegal lobster fishing.

Along the eastern shore of the province, four chartered boats, *Gulf Rover*, *Gulf Racer*, *Gulf Ranger*, and *Gulf Raider*, and the local patrol boat *Brant*, were used throughout the season. The *Gulf Raider* was employed for about a month at Prince Edward Island. In addition, the regular boats *Gilbert* and

Venning were employed to assist in the salmon fishery patrol for about a month and a half each, the former on the *Restigouche* where she supervised the weekly closed period and assisted in towing salmon pontoons to the New Mills Pond, the other on the *Miramichi* salmon drift-line. Both boats gave valuable assistance in the administration of the salmon fishery. The C.G.S. *Arleux* also gave assistance on the protection of the Eel River lobster boundary line.

The locally employed boats were used in the administration of the salmon, lobster, oyster and smelt fisheries.

The following table shows the dates of service and the mileage of the chartered boats:—

Name of Boat	Dates Employed	Mileage
<i>Gulf Ranger</i>	April 26—November 12	9,777 miles
<i>Brant</i>	April 26—November 23	2,850 "
<i>Gulf Rover</i>	April 27—November 12	6,247 "
<i>Gulf Raider</i>	May 25—November 11	6,390 "
<i>Gulf Racer</i>	May 23—November 30	7,180 "
		32,444 "

PRINCE EDWARD ISLAND

Eight patrol boats were engaged during the past season in fisheries protective work in this district and were allocated as follows: West Prince, 3; East Prince, 1; Queens, 3, and Kings, 1. Assistance was also given by C.G.S. *Arleux* and the patrol boat *Gulf Raider* at intervals during the season.

The chartered boats *Langholm* and *Dolphin* performed patrol service in Prince county from North cape to West point, the *Dolphin* operating between April 29 to May 31, when the *Langholm* was chartered in the service, continuing patrol operations up to and including November 20. A total mileage of 7,081 miles was covered by these two boats and the following seizures made: 483 traps, 4,865 fathoms of rope, and 391 pounds of lobsters. Very satisfactory results were obtained from this patrol service.

The chartered boat *M.H.G.* went on patrol in Cascumpec bay on July 12, continuing in the service until November 26. Some 3,154 miles were travelled and the following seizures made: 203 traps, 1,960 fathoms of rope, 273 pounds of lobsters, and one dory. Patrolling the Cascumpec bay district, the boat produced satisfactory results.

The chartered boat *Girl Pat* operated in the Richmond Bay district between August 1 and October 31, accomplishing satisfactorily a total mileage of 3,484 miles and seizing 78 traps and 450 fathoms of rope.

The chartered boat *Beulah* patrolled 1,851 miles, operating in the Malpeque-North Lake area between July 5 and October 4 and the following seizures were made during the period of operations: 461 traps, 4,905 fathoms of rope and 396 pounds of lobsters.

The chartered boat *Seabird* operated satisfactorily in the Malpeque-North Lake area from August 1 to September 30, and patrolled some 1,591 miles. She seized 17 traps and 140 fathoms of rope.

The *Capitol* and *Velox* patrolled the Victoria-Georgetown district, the former being on duty from June 23 to July 24, on which date the newly-built government-owned *Capitol* took up her duties, continuing in the service until November 2. From November 3 to 15 the crew of the *Capitol* were engaged in preparing the boat for and hauling it up into winter quarters. A total mileage of 7,355 miles was patrolled by the two boats and the following seizures were made: 211 traps, 1,942 fathoms of rope, 136 pounds of lobsters and one salmon gill-net and piece of herring net.

The chartered boat *B. and B.* patrolled very satisfactorily between Souris and Georgetown from August 1 to October 31, covering a total mileage of 2,655 miles and making the following seizures: 471 traps, 2,205 fathoms of rope and 1,775 pounds of lobsters.

The C.G.S. *Arleux* performed patrol duties of a most satisfactory nature in the straits of Northumberland, at intervals between April 27 and September 30. In the course of her patrol 59 traps and 16 berried lobsters were seized. Through the efforts of this boat and crew two prosecutions of persons in East Prince county for having berried lobsters were effected. The checking of licences and of spawn lobsters, important phases of lobster protective work, was successfully carried out by this boat.

The department-owned boat *Gulf Raider* patrolled the North Point boundary line in West Prince county from May 28 to June 14. In the prevention of illegal fishing between Districts No. 7 and 8 this boat's services were most effective.

MAGDALEN ISLANDS

The water patrol service in the Magdalens is provided by staunch motor boats owned and operated by the fisheries inspectors located on the islands, assisted by temporary employees. The lagoons formed by a series of sand bars joining the various islands are lobster sanctuaries and require constant protection during the close season. There is also the need of the northern inspector making patrols to Bryon island and Bird rocks in connection with his official duties. Due to the efforts of these officers and their boats illegal fishing for lobsters has been practically eliminated during the past few years.

GULF AREA

An efficient water patrol service in the gulf area of this division is essentially needed, owing to the variety of conditions prevailing there in connection with the fisheries. The greatest need is a protection of the lobster fisheries and the patrol boats named in this report are primarily engaged in this work. The lobster fishing seasons in this area open and close at different times and this involves the protection of lobster boundary lines to prevent the running of lobsters from closed to open districts. Speedy patrol boats are required for this particular work and there is also the need of protecting the large water area that is closed to lobster fishing after the spring fishing seasons terminate. The patrol boats are also used in connection with salmon, oysters, smelt and other fisheries and occasionally for the control and supervision of netting in certain areas.

LOBSTER PACK AND THE INSPECTION OF CANNERIES

During 1938 licences to pack lobsters and tomalley were issued covering 215 canneries. Of the number licensed, 213 canneries were actually operated, as compared with 239 in 1937, 256 in 1936 and 270 in 1935.

Comparative figures by provinces show the following distribution:—

Province	1938	1937	1936	Decrease	
				1938-37	1938-36
Nova Scotia.....	63	72	76	9	13
New Brunswick.....	76	78	81	2	5
Prince Edward Island.....	65	74	84	9	19
Magdalen Islands.....	11	15	15	4	4
Totals.....	215	239	256	24	41

Lobster Pack.—During 1938 there was a total production of canned lobster within the Maritime Provinces and the Magdalen Islands amounting to 91,746 cases, as against 88,181 cases canned during 1937, an increase of 3,565 cases or 4 per cent.

Comparing the 1938 pack with previous years the following results are noted:—

Year	Pack	Increase or Decrease	Percentage Increase or Decrease
	Cases	Cases	%
1938.....	91,746		
1937.....	88,181	+ 3,565	+ 4.1
1936.....	87,390	+ 4,356	+ 4.8
1935.....	98,964	— 7,218	— 7.3
1934.....	114,679	— 22,933	— 19.1
1933.....	120,771	— 29,025	— 24.3
1932.....	164,981	— 73,235	— 44.4
1931.....	145,488	— 53,742	— 36.9

Statistics for 1938 show increases in pack in Nova Scotia, Prince Edward Island and the Magdalen Islands and a decrease in New Brunswick:—

Province	1938	1937	Increase or Decrease
	Cases	Cases	Cases
Nova Scotia.....	37,838	34,649	+ 3,189
New Brunswick.....	23,060	26,957	— 3,897
Prince Edward Island.....	24,625	20,952	+ 3,673
Magdalen Islands.....	6,223	5,623	+ 600
	91,746	88,181	+ 3,565

The pack for Nova Scotia in 1938 increased by 9.2 per cent as compared with 1937 output and the following increases and decreases when compared with production for previous years:—

Year	Pack	Decrease	Percentage of Decrease
	cases	cases	%
1936.....	37,690	+ 156	+ .4
1935.....	46,863	— 9,045	— 19.3
1934.....	50,553	— 12,715	— 25.1
1933.....	50,729	— 12,891	— 25.4

The New Brunswick pack when compared with 1937 shows a decrease of 3,897 cases or 14.4 per cent and for previous years the following increases and decreases may be noted:—

Year	Pack	Increase or Decrease	Percentage
	cases	cases	%
1936.....	20,428	+ 2,632	+ 12.9
1935.....	18,275	+ 4,785	+ 26
1934.....	23,815	— 755	— 3.2
1933.....	26,417	— 3,357	— 12.7

The pack in Prince Edward Island shows an increase of 3,673 cases or 17.5 per cent. Compared with other years, the following increases and decreases may be noted:—

Year	Pack	Increase or Decrease	Percentage
	cases	cases	%
1936.....	22,345	+ 2,280	+ 10.2
1935.....	25,170	— 545	— 2.2
1934.....	30,214	— 5,589	— 18.5
1933.....	32,895	— 8,270	— 25.1

On the Magdalen Islands the pack for 1938 was 6,223 cases compared with 5,623 cases in 1937, an increase of 600 cases or 10.7 per cent. Compared with other years, the following decreases and percentages of decrease may be noted:—

Year	Pack	Decrease	Percentage
	cases	cases	%
1936.....	6,927	703	10.1
1935.....	8,656	2,433	28.1
1934.....	10,097	3,874	38.3
1933.....	10,730	4,507	42.

During the 1938 spring season 71,751 cases were canned as compared with 67,224 cases in the spring of 1937, an increase of 4,527 cases or 6.7 per cent. Provincial figures covering spring pack show the following increases or decreases:—

Province	Packed		Increase or Decrease	Percentage Increase or Decrease	
	1933	1937			
	cases	cases	cases		%
Nova Scotia.....	36,767	34,018	+ 2,749	+	8.
New Brunswick.....	8,638	10,051	— 1,413	—	14.
Prince Edward Island.....	20,469	17,531	+ 2,938	+	16.7
Magdalen Islands.....	6,223	5,623	+ 600	+	10.7

During the fall season of 1938 the pack was 19,735 cases as compared with 20,917 cases in 1937, a decrease of 1,182 cases or 5.6 per cent. Provincial figures covering the fall pack show the following increases or decreases.

Province	Packed		Increase or Decrease	Percentage Increase or Decrease	
	1938	1937			
	cases	cases	cases		%
Nova Scotia.....	1,079	760	+ 319	+	41.9
New Brunswick.....	14,499	16,728	— 2,229	—	13.3
Prince Edward Island.....	4,157	3,429	+ 728	+	21.2

Cannery Inspection.—During 1938 careful attention was given to the inspection of all canneries and 1,195 inspections were carried out by 36 inspecting officers, the average number of inspections being 10 per cannery.

Underweights.—Particular care was again given to “Underweights” and the fact that only 14 instances of suspected underweight cases were reported as against 16 in 1937, 24 in 1936 and 29 in 1935 can be taken as an indication of better cannery practice. Of the 14 lots of suspected underweights only 6 lots were adjudged underweight.

The following number of cases were marked “Underweight” during 1938 as compared with 1937:—

Province	1938	1937
Nova Scotia.....	Nil cases 12 oz. pack 19 cases 6 oz. pack 5 cases 3 oz. pack	Nil cases 12 oz. pack 81 cases 6 oz. pack Nil cases 3 oz. pack
New Brunswick.....	Nil cases 12 oz. pack 32 cases 6 oz. pack 10 cases 3 oz. pack	Nil cases 12 oz. pack Nil cases 6 oz. pack Nil cases 3 oz. pack
Prince Edward Island and Magdalen Islands.....	Nil cases 12 oz. pack 150 cases 6 oz. pack 65 cases 3 oz. pack	7 cases 12 oz. pack 80 cases 6 oz. pack 11 cases 3 oz. pack
Totals.....	Nil cases 12 oz. pack. 201 cases 6 oz. pack 80 cases 3 oz. pack	7 cases 12 oz. pack 161 cases 6 oz. pack 11 cases 3 oz. pack

There was one instance in 1938 in which a canner allowed lobster meat to remain on the tables too long before canning. This lot was held by the inspecting officer for further examination and was subsequently found to be unfit for human consumption.

Cannery Grading.—During the year all canneries were graded by the fisheries inspectors and a general improvement in canneries was noted. This seemed to indicate a greater willingness on the part of canners to co-operate with our officers towards producing a better pack. Four canneries in New Brunswick were closed after failing to attain the minimum grading marks required by the regulations.

INSPECTIONS UNDER THE FISH INSPECTION ACT

The regulations under the Fish Inspection Act were revised early in the year and extended to cover the inspection of pickled mackerel fillets, pickled headless and pickled trimmed herring. Later in the year provision was also made by regulation to cover the inspection of “Select Cup-shaped” oysters and to extend the inspection and grading of frozen smelts to the entire coast of New Brunswick. The latter measure was taken after some experience with such grading and inspection on certain parts of the east coast during the previous year.

The comparison of work performed under the Fish Inspection Act for the past two years is as follows:—

	1938	1937
Educational visits.....	4,595	3,797
Inspections of premises.....	6,328	3,943
Empty containers inspected.....	311,205	348,005
Pickled alewives inspected.....	11,970	11,242
Pickled herring inspected.....	17,814 <i>x</i>	6,278 <i>x</i>
	11,032 <i>y</i>	5,867 <i>y</i>
	78 <i>f</i>	24 <i>f</i>
	10,854 <i>p</i>	6,791 <i>p</i>
Headless herring inspected.....	795 <i>x</i>	
	12 <i>y</i>	
Pickled mackerel inspected.....	54,126 <i>x</i>	41,263 <i>x</i>
	197 <i>y</i>	327 <i>y</i>
	43 <i>f</i>	
	439 <i>p</i>	130 <i>p</i>
Pickled mackerel fillets inspected.....	8,148 <i>x</i>	
	6 <i>y</i>	
	129 <i>p</i>	
Hard cured smoked round herring inspected.....	221,231 <i>b</i>	226,555 <i>b</i>
Oysters inspected.....	21,156 <i>x</i>	17,119 <i>x</i>
	2,530 <i>xx</i>	2,487 <i>xx</i>
	194 <i>y</i>	
Frozen smelts inspected.....	160,921 <i>z</i>	7,481 <i>z</i>
Dried fish inspected, pounds.....	839,600	2,648,750

(*x*—barrels). (*y*—half-barrels). (*f*—quarter-barrels). (*p*—pails). (*b*—18 pound boxes).
(*xx*—1½-1¼ or 1 bushel boxes). (*z*—15 or 10 pound boxes).

Of the above containers and fishing products listed the supervisor who is in charge of pickled fish inspection reported that 967 empty containers were reconditioned and 10,082 rejected and that the following products were reconditioned as required by the regulations:—

Alewives	60 barrels
Herring	796 barrels
	189 half-barrels
	64 pails
Headless herring	8 barrels
Mackerel fillets	50 pails
Mackerel	1,443 barrels, 3 half-barrels
Oysters	162 barrels, 164 boxes
Hard cured smoked round herring.....	9,000 boxes

Reinspections as provided by the regulations were conducted with the following results:—

Mackerel.—Sixty-one barrels below quality and short in weight; 38 barrels below quality; 6 barrels below quality and ungraded; 12 barrels ungraded; 21 barrels stencilled "Tropics"; 28 barrels short in weight; 29 barrels original inspections confirmed.

Mackerel Fillets.—Ten barrels ungraded.

Herring.—Thirty barrels below quality; 57 barrels mixed quality and ungraded; 11 barrels ungraded; 47 barrels marked "Dark Fat."

Inspections under the regulations made under the Fish Inspection Act are carried out by the permanent fishery officers of the division with such temporary assistance as may be needed in the heaviest producing districts. During the year fifty-six permanent officers were engaged in this work assisted by thirty-eight temporary employees. Most of the latter were used in connection with the grading of frozen smelts in New Brunswick, with satisfactory results. The smelt fishermen and dealers, generally, realized that in order to compete successfully in export markets the product must be standardized and while the

smelt inspection regulations applied only to the grading of fish for size and the marking of containers this was a sound basis for standardization and encouragement to the producers to pack a uniform product. Satisfactory results were also achieved in connection with the grading of oysters as well as the inspection of oysters for size and standard containers.

ILLEGAL FISHING

Reference is made in the 1937 annual report for the division to the extremely difficult illegal lobster fishing situation that was dealt with in that year in the gulf area, particularly the parts adjoining the boundaries of the late lobster fishing season, and gratification is expressed that it could at that time be said with confidence that conditions with respect to illegal fishing had very greatly improved. This improvement continued during the past year and there was much more evidence of co-operation between the fishermen and the protective forces than in the past. The supervisors of fisheries who are responsible for these areas report as follows:—

“So long as the severe economic conditions prevail there will always be the problem of illegal fishing but due to the organization and educational work being carried on in the fishing communities it is easier to obtain the support of the right thinking fishermen to the enforcement of the regulations than it was in the past. Salmon, smelts, lobsters and oysters are always saleable and there is therefore great inducement to illegal fishing, but this has been kept at a minimum, due to the more effective protective work. Viewing the situation as a whole, fishing regulations were satisfactorily observed during the past season. Attempted violations have been successfully frustrated at the outset by co-operation on the part of the land and water forces and during the entire year the regulations were well enforced.”

The co-ordination of land and water protective forces in the areas where in the past the most difficulty was experienced with illegal fishing has been most effective. The prosecutions and confiscations, by provinces, in 1938 were as follows:—

	Prosecutions	Confiscations
Nova Scotia	115	373
New Brunswick	81	352
Prince Edward Island	42	80
Magdalen Islands	nil	1
	238	806

REDUCTION OF FISH WASTE AND COARSE FISH

During the year twenty firms in the division produced fish meal and oil. Of these, thirteen were located in Nova Scotia and seven on the Bay of Fundy coast of New Brunswick. Returns from these firms indicate that the following quantities of fish meal and oil were produced* :—

	Quantity	Value
Fish meal.....	3,138 tons	\$ 379,529
Cod oil.....	30,099 gallons	14,954
Medicinal oil.....	40,784 gallons	21,258
Common oil.....	24,436 gallons	14,204
Herring oil.....	92,243 gallons	24,482
Halibut livers.....	17,220 lbs.	5,166
Kelp meal.....	29½ tons	1,685
Seaweed meal.....	22 tons	1,100
Herring scales.....	26½ tons	771

* The figures include the production of firms but do not represent the total quantity of oil produced in the division.

LOSS OF LIFE

It is regretted to report a loss of nineteen fishermen during the year. Of these seventeen were from Nova Scotia ports and two from Charlotte county, New Brunswick.

LOSS OF GEAR

The estimated value of fishing equipment destroyed in the division by accident and storms during the year was over \$375,000. The severest losses were in the southwestern part of Nova Scotia in lobster traps, boats and gear, destroyed in the heavy December storm previously mentioned, and on the east coast of New Brunswick and in Prince Edward Island where a similar storm did much damage in the latter part of November. No part of the division, however, escaped the damage caused by storms which were frequent throughout the fishing seasons.

SEAL BOUNTY

Bounty on hair seals at the rate of \$2.50 per snout which rate was authorized in 1937, was continued during the past year. The number of these animals, which are so destructive to important shore fisheries, on which bounty was paid increased by 344 when a greater number of seals were being killed in the Magdalen Islands.

The comparative results for the division for the past two fiscal years is as follows:—

	1933-39		1937-38	
	Number	Bounty	Number	Bounty
		\$ cts.		\$ cts.
Nova Scotia.....	2,107	5,267 50	2,336	5,840 00
New Brunswick.....	602	1,505 00	642	1,605 00
Prince Edward Island and Magdalen Islands	1,672	4,180 00	869	2,172 50
Totals for division.....	4,381	10,952 50	3,847	9,617 50

COLLECTION SERVICE

The bait collection service operated in the Canso area for the past few years was continued from July 25th to September 29th, except from August 6 to August 14 when bait was not required. A total of 20,730 pounds of bait was collected and distributed to the fishermen.

One of the outstanding developments of the year in the eastern part of the province was the operation of a collection service for late caught fresh line fish under joint arrangements between the Maritime National Fish Limited and the United Maritime Fishermen assisted by the department and by the Government of Nova Scotia.

Notwithstanding most unfavourable weather conditions and the late appearance of dogfish on the inshore fishing grounds, as well as lack of needed storage of bait and ice at the ports of call, the venture was regarded as quite successful and a real benefit to many of the shore fishermen. The service commenced on October 1 and continued until January 15. Two staunch collecting smacks were used throughout the season with another smaller boat for local collections as required. The ports of call were Petit de Grat, Canso, Dover, Port Felix, Larry's river, Charlos cove, New harbour, Coddles harbour, Drum head, Port Bickerton and Marie Joseph. The fish were delivered at the Maritime National fish plant at Halifax, the locals of the United Maritime Fishermen taking care

of the buying and loading arrangements at the outports and the company supplying the boxes and sending ice and bait down shore to the fishing ports. A total of 1,478,943 pounds of fish were carried during the collecting period.

This service greatly stimulated interest in fall and early winter inshore fishing and encouraged fishermen to equip themselves with better boats and gear in order to continue fishing operations at a time when they would otherwise be idle.

FISHING FLEETS

The Lunenburg salt fishing fleet made the three regular trips to the banks and total landings were somewhat greater than in 1937 which was the highest catch for quite a few years. Twenty-eight vessels in all engaged in this method of fishing as compared with twenty-five vessels. Following is a comparison of the catches of the three trips to the banks:—

	1938	1937
Frozen baiting.....	14 vessels— 8,500 qtls.	13 vessels— 6,900 qtls.
Spring.....	24 “ 26,500 “	24 “ 28,500 “
Summer.....	28 “ 72,800 “	29 “ 869,000 “
	107,850 “	104,450 “

Prices were little changed from those paid in 1937 but one of the most discouraging features of the salt fish industry was that weather conditions during the spring and summer were unfavourable for drying fish. Continual rains made drying most difficult and tended to increase spoilage and adversely affect the quality of fish.

Fresh Fishing.—Two new vessels of the modern type for fresh fishing were added to the fleet, the *Lillah M. Boutillier* and the *Teresa H. Connors*. These vessels were built at Lunenburg and are owned and operated by the Maritime National Fish Limited, Halifax.

The larger heavy powered vessels mostly hailing from Lunenburg continued in the fresh fishing industry during the winter months following a period of unemployment which terminated on January 19th when the majority of the fresh fishing fleet returned to the banks. Many of the vessels engaged in salt fishing during the spring and summer and some of them again turned to fresh fishing during the fall. October was a month of very heavy production and marketing conditions, due to low prices and high inventories, were unfavourable and continued so until the end of the year. Severe weather conditions tended to improve the situation somewhat during December but as the year closed the outlook for the fresh fish industry was still difficult.

The last report for the division referred to the unsatisfactory condition of the formerly large and important cod fishing fleets of Lameque and Caraquet in Gloucester county, New Brunswick. It is regrettable to report no improvement in this regard and that only 140 vessels operated in the codfishing fleets from these ports during the year although a few years ago the fleet was over 240 sail. The loss of important markets, as a result of world conditions, is responsible for the decline in this industry which produced the high quality Gaspé cured codfish. Many of the vessels during the past year were obliged to sell their fares in the green state for heavy salting.

EDUCATIONAL WORK

Reports received from the fishery officers indicate the wide extent to which educational work is being carried on among the fishermen and dealers and the variety of conditions that are found along the coasts of this division. Such

work includes instruction in methods of preparing, curing, grading and packing fishery products, sterilization and sanitation of fishing premises and the care and handling of live lobsters and fresh caught fish.

On the east coast of New Brunswick rapid progress has been made during the past few years in adult education in fishing communities. Under arrangements made by the department with the Extension Branch of St. Francis Xavier University this work has been extended widely in the three provinces and is resulting in the formation of numerous study groups, various organizations of fishermen and so on and is providing a firm foundation for sound co-operative activity. Many such groups have been most active and enthusiastic in taking advantage of the facilities provided for the inspection and grading of fishery products, such as canned lobsters, oysters, frozen smelts and some varieties of cured fish. The application of inspection requirements looking to the standardization of product by means of proper grading, packaging and marking is much simplified and made much more effective when it is possible to deal with trained groups of producers and packers who in their own interests understand and are fully prepared to meet market requirements.

DEPARTMENTAL STAFF

During the year there were a number of changes in the permanent staff and it is with great regret that the death of W. E. Joy, inspector for the Grand Manan area, on September 21 is reported. A. G. MacLeod, supervisor of fisheries in Cape Breton, took his retirement leave on October 26 and three of the older inspectors of the division were retired during the year. These were Inspector R. S. Smith, of Pugwash, N.S., on December 31, due to illness, and Inspector J. G. D'Entremont, of Middle West Pubnico, N.S., on October 11, and Inspector M. W. Williston, of Bay du Vin, N.B., on November 28, on reaching retiring age. Miss L. A. Ingraham, of the Pictou office, and Miss M. A. Awalt, of the headquarters office, resigned from the service on December 31 and August 31, respectively.

New appointments to the service included those of Inspector H. J. Robichaud, Newcastle, N.B., on June 16 and Inspector Arthur J. Caissie, at Shediac, N.B., on June 9. Five seasonal inspectors were also employed in certain areas for fish inspection work.

The classification of those employed in the administrative services of the division during 1938 was as follows:—

Chief and district supervisors.....	10
Inspectors and clerical staff.....	82
Fishery guardians.....	617
Patrol and Protection Service.....	100
	<hr/> 809

ANNUAL REPORT OF CHIEF SUPERVISOR OF FISHERIES (MAJOR J. A. MOTHERWELL) WESTERN DIVISION (BRITISH COLUMBIA) FOR 1938

Thirty-eight salmon canneries operated in British Columbia during the year. This number compares with seventy-six in the years 1926 and 1927 and ninety-four in 1917. The recent tendency has been to concentrate canning operations at some central point rather than have separate establishments scattered all along the coast, at a high cost in the way of separate overhead. With improved facilities for the transportation of fish long distances, canning companies have found it desirable to close some of their plants and carry their salmon as far as 250 miles to a central point.

The early run of spring salmon off the shores of British Columbia was not up to expectations. On the other hand, there was an unusually large run of cohoes.

The trollers' catches of cohoes would have been considerably greater than they were had it not been that for some unknown reason the fish did not take the trollers' bait so readily as in other years; this condition, in fact, is reported to have obtained all along the Pacific coast during 1938, from Alaska to the Columbia river. The gillnetters, however, had an unusually good season in coho fishing.

The sockeye run to the Alberni Canal district, which has been restored through the efforts of the department in the way of conservation and fish culture, is being maintained at a very satisfactory point. The department's efforts towards rehabilitation have been outstanding in this area.

In the annual report for the year 1937 particulars were given regarding the number of sockeye salmon in the principal gillnet areas required to produce one standard case of 48 one-pound tall cans. The figures for the year under review are given as follows:—

	No. of Sockeye per Case Canned*
Naas river..	12.24
Skeena river..	13.17
Rivers Inlet..	12.50
Smiths Inlet..	10.50
Bella Coola..	13.95
Butedale..	14.68
Fraser river..	10.89

*Averages are based on the pack of sockeye in each of the districts mentioned, regardless of where caught.

It will be observed that the individual fish in 1938 running to the Smiths Inlet and the Fraser River districts were considerably larger than those of the preceding year.

CANNED SALMON

With a total pack of all varieties of canned salmon reaching 1,707,830 cases the year 1938 produced the second largest pack of canned salmon since the record-making season of 1930.

The following are the five-year averages of total packs of all varieties during the past fifteen years:—

	Cases
1924-1928..	1,786,186
1929-1933..	1,330,365
1934-1938..	1,641,996

SOCKEYE

There was an unusually large pack of sockeye, the total reaching 447,453 cases, which considerably exceeds the average for the past fifteen years and compares with 383,515 cases, the average for the immediately preceding five years, as shown by the following statement:—

	Cases
1924-1928..	322,162
1929-1933..	318,582
1934-1938..	383,515

Naas River Area.—The total of 21,746 cases of sockeye for the Naas area is considered a good average pack for the area and compares very favourably with the pack of 10,173 cases in the five-year cycle year of 1933, although short of the total of 36,242 cases in the four-year cycle of 1934.

Skeena River Area.—The total pack of sockeye from the Skeena River run, amounting to 46,988 cases, shows a definite increase over the five-year cycle year of 1933 when 27,693 cases were packed. It is little short, however, of the four-year cycle year of 1934 when 54,558 cases were packed.

It must be remembered that in recent years the fishing on the Skeena has been materially curtailed as a result of moving the fishing boundary seven miles downstream and changing the opening date for sockeye fishing from June 20 to the last week-end of the month. Considering these restrictions, the pack of 1938 can be considered as reasonably satisfactory and would appear to be encouraging for the future.

Rivers and Smiths Inlets.—The total of 122,093 cases of sockeye packed in the year under review compares with 119,548 cases in the five-year cycle year, 1933, and 89,575 cases in the four-year cycle year, 1934. The total is quite encouraging and it is felt that Rivers and Smiths inlets, under present regulations, should never have a failure.

Fraser River Area.—The total sockeye pack for the year was the largest since 1914, or 169,430 cases, compared with 133,159 cases in the brood year, 1934. Very little of the 1938 pack was from the early run, which proceeds to the higher reaches of the Fraser River watershed. The largest runs were of the later fish proceeding to the Shuswap area, although the supplies to the Pemberton and Pitt systems were good.

An outstanding feature of this year's pack from Fraser River sockeye was the unusually large size of the individual fish. The average number of fish to the case, in the pack produced from the run proceeding to the Fraser waters, was only 10·33. On the other hand, the average for the total pack put up in the Fraser district from sockeye from all sources was 10·89 fish; in other words, the Fraser sockeye were much larger than the salmon brought in from other localities such as Nitinat, Rivers inlet, etc., for processing in the Fraser area.

Statement No. 15 shows the pack of sockeye salmon caught en route to the Fraser river, via Juan de Fuca straits, Puget sound, which is in United States territory, the gulf of Georgia and the Fraser itself.

It will be observed that the five salmon traps permitted in the Sooke area accounted for 1·2 per cent of the total run of sockeye to the Fraser river.

COHOES

Coho pack showed considerable increase over that of any previous year and amounted to 273,706 cases. The run was unusually large in numbers and also in the size of the individual fish.

It will be remembered that in 1937 the supply of cohoes all along the Pacific coast was short but just the reverse condition obtained in 1938. In view of the unusually large size of the individual fish in 1938 there may be some merit in the suggestion that a larger percentage of the cohoes remained another year on the feeding grounds before seeking the spawning streams.

The following statement shows the five-year average pack of cohoes during the past fifteen years:—

1924-1928	155,746 cases
1929-1933	139,478 "
1934-1938	202,413 "

PINKS

The total of 400,876 cases of pinks was disappointing. One reason for the small total was the disappointing size of the catch in the Massett Inlet area. Whilst the streams in the section were fairly well seeded the fish apparently were difficult to catch, but in any event the size of the run was considerably smaller than anticipated.

It is interesting to note that the Fisheries Research Board of Canada is continuing the investigation of the habits of the pink salmon run in the Massett district, and it is hoped that in the near future there will be information avail-

able to show whether there is anything in the contention that in certain years the pink salmon run is diverted from the Massett area to southeastern Alaska streams.

The two-year average packs of pinks during the past fourteen years have been as follows:—

1925-1926	609,196 cases
1927-1928	519,989 "
1929-1930	794,953 "
1931-1932	215,355 "
1933-1934	483,961 "
1935-1936	553,249 "
1937-1938	493,226 "

CHUMS

The quantity of chums packed was satisfactory, totalling 541,812 cases, which is considerably in excess of the five-year average for the 15-year period, 1924-38, as shown by the following statement:

1924-1928	661,145 cases
1929-1933	296,497 "
1934-1938	501,937 "

CANNED SALMON INSPECTION

The following statements give the results of the year's inspection of canned salmon at the departmental inspection laboratory situated in Vancouver:—

Number of inspections made.....	3,017
Total number of cases inspected.....	1,651,863½
Total number of cases below certificate standard.....	32,204
Total number of cases available for certificates.....	1,619,659½

DETAILS OF CANNED SALMON INSPECTION ACCORDING TO SPECIES

Species	Number of Cases Inspected	Number of Cases below Certificate Standard	Number of Cases Eligible for Certificates
Sockeye.....	444,500½	20,304½	424,196
Springs.....	13,871½		13,871½
Steelheads.....	730		730
Bluebacks.....	27,404	164	27,240
Coho.....	237,978½	1,017½	236,961
Pinks.....	420,393	8,583	411,810
Chums.....	506,986	2,135	504,851
Totals.....	1,651,863½	32,204	1,619,659½

PARTICULARS OF NON-CERTIFIED CANNED SALMON ACCORDING TO SPECIES

Species	Below Grade B	Grade B	Tips and Tails	Minced	Flaked	Totals
Sockeye.....		15,446	4,083½	302	473	20,304½
Springs.....						
Steelheads.....						
Bluebacks.....	12½	56½	18	77		164
Coho.....	190	668½	76		83	1,017½
Pinks.....	37	6,837	1,709			8,583
Chums.....	650	1,485				2,135
Totals.....	889½	24,493	5,886½	379	556	32,204

A more detailed account of the operations at the Laboratory is contained in the annual report of the Chief Chemist, Mr. F. Charnley. (Appendix No. 6).

The inspection fees collected at the rate of one-half cent per case totalled \$8,219.43.

CANNED SALMON—FRENCH QUOTA

The quota for the calendar year of 1938 allotted by the French authorities to Canada totalled 31,250 metric quintals, as follows:—

First quarter	8,125 quintals
Second quarters	8,125 "
Third quarters	7,500 "
Fourth quarter	7,500 "

In previous years certificates of origin have been issued at this office but commencing with the year 1938 other arrangements were made.

DRYSALTED SALMON

Under the operations of the British Columbia Salt Fish Board which controls all drysalt salmon, a total of 69,209 hundredweight was processed and marketed in the Orient. This shows a very considerable reduction over previous years and is accounted for by the difficult conditions obtaining generally at the present time in the Orient.

The following statement shows the pack of drysalt salmon by species, since 1925:—

—	Sockeye	White Springs	Cohoos	Pinks	Chums	Totals
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
1925.....		4,580		2,137	131,737	138,454
1926.....					139,858	139,858
1927.....					81,170	81,170
1928.....			48		170,205	170,253
1929.....					77,362	77,362
1930.....				1,291	114,932	116,223
1931.....	520	9,743	4	40,371	336,055	386,693
1932.....		8,142			119,147	127,289
1933.....		89		7,469	75,317	82,875
1934.....			2		90,979	90,981
1935.....	4	1,354	34	6,173	139,076	146,641
1936.....		2,780		76	150,637	153,493
1937.....				1,292	107,691	108,983
1938.....			12		69,197	69,209

POWER BOATS IN SALMON GILLNET FISHING

Statement No. 14 shows an increase of 320 power boats used, compared with the season of 1937, in salmon gillnet fishing in District No. 2. This is the highest total since power boats were permitted.

SALMON TAKEN BY INDIANS IN THE FRASER RIVER WATERSHED FOR PURPOSE OF THEIR OWN FOOD REQUIREMENTS

The following are the particulars of the catches of salmon taken by Indians for their own food purposes, under special free permits, in the Fraser River watershed:—

Fraser River	Sockeye	Springs	Coho	Chums	Steelhead	Total
Prince George subdistrict...	2,198	350				2,548
Quesnel subdistrict.....	475	50				525
Kamloops subdistrict.....	9,395	1,335	764			11,494
Hope subdistrict.....	2,590	2,250	630	230	310	6,010
Squamish subdistrict.....	2,000	1,150	1,050	600	250	5,050
North Vancouver subdis- trict.....			285	330		615
Chilliwack subdistrict.....	8,400	2,870	4,905	6,650	2,110	24,935
Lower Mainland sub- district.....	380	160	1,695	2,170	305	4,710
Totals.....	25,438	8,165	9,329	9,980	2,975	55,887

SALMON—BRINE CURED

A new development worthy of note was the brine curing of 68,949 chum salmon at one plant in Barclay sound. After curing, the fish were packed in barrels containing 900 pounds each, and shipped to the Japanese market.

SALVAGING OF SALMON FRY

Owing largely to deforestation, a number of the smaller salmon streams dry up each year in the summertime, resulting in considerable quantities of salmon fry being stranded in the upper reaches. As these conditions are observed by the fishery officers the fry are conveyed to areas from which they can safely reach the salt water. In this way many thousands are saved. The following is a statement of the work which has been done during the year:—

Area	Method	Coho	Chums	Springs	Steelhead	Total
		No.	No.	No.	No.	No.
<i>District No. 1—</i>						
Squamish.....	Netting	12,000		10,000		47,000
Squamish.....	Ditching	14,000		11,000		
Chilliwack.....	Netting	600				17,600
Chilliwack.....	Ditching	7,500	9,500			
North Vancouver.....	Netting	992				992
<i>District No. 3—</i>						
Nanaimo.....	Netting	735,500	12,600		3,400	1,411,500
Nanaimo.....	Ditching	644,500	12,200		3,300	
Cowichan.....	Netting.....	630,600	331,000		75,000	2,086,600
Cowichan.....	Ditching	635,000	335,000		80,000	
Victoria.....	Netting	9,600	1,650		1,800	30,050
Victoria.....	Ditching	12,350	1,450		3,200	
Nitinat.....	Netting	91,000	56,000		23,000	220,000
Nitinat.....	Ditching	27,000	20,500		2,500	
Pt. Renfrew.....	Netting	153,000				203,000
Pt. Renfrew.....	Ditching	50,000				
Ladysmith.....	Netting	17,000				45,000
Ladysmith.....	Ditching	28,000				
Courtenay.....	Netting	63,300				75,300
Courtenay.....	Ditching	12,000				
Totals.....		3,143,942	779,900	21,000	192,200	4,137,042

SALMON CULTURE

In an attempt to develop a run of sockeye salmon to Maggie lake, which is situated in Barclay sound, on the west coast of Vancouver Island, 1,050,000 sockeye eggs were collected at Anderson lake and "eyed" at the old hatchery building. After a normal loss of 16,641 the remaining 1,033,359 eggs were successfully planted in Hillier creek, tributary to Maggie lake.

No salmon had heretofore frequented the lake, a condition which was due, no doubt, to the fact that there was an impassable fall in the outlet stream. In 1937 the department built a fishway in this obstruction and there is now every reason to believe that any fish wishing to ascend to Maggie lake will be able to do so.

HALIBUT

Landings of halibut at British Columbia ports by Canadian and United States vessels, as shown by the following statement, totalled 193,488 hundred-

weights, which is 6,063 hundredweights greater than the total for the previous year and constitutes the largest total in British Columbia since 1930. Landings were larger at Vancouver, New Westminster, Butedale and Vancouver Island points. Of the 1938 total 120,247 hundredweights were from Canadian vessels and 73,241 hundredweights from United States craft. The statement follows:—

Year	Vancouver and New Westminster	Prince Rupert	Butedale	Vancouver Island points	Totals
	cwts.	cwts.	cwts.	cwts.	cwts.
1930.....	11,387	293,617	978	2,814	308,796
1931.....	8,498	167,757	3,627	2,123	182,005
1932.....	11,883	148,615	6,677	1,672	168,847
1933.....	13,436	144,065	10,431	2,440	170,372
1934.....	16,113	150,476	13,297	2,716	182,602
1935.....	22,351	129,586	15,713	3,493	171,143
1936.....	20,777	131,830	11,522	3,992	168,121
1937.....	23,334	147,638	12,676	3,777	187,425
1938.....	28,155	141,691	17,776	5,866	193,488

LIVER PRODUCTION

There was an increase of 71.1 per cent or 1,267 hundredweights in the landings of halibut livers, over the total for 1937. The average value, however, showed a reduction of \$2 per hundredweight, that is, \$50.97 compared with the 1937 price of \$52.97.

The following statement gives halibut liver production figures for 1933-38 period:—

Year	Cwts.	Marketed Value	Average Value per Cwt.
		\$	\$ cts.
1933.....	2,293	45,995	20 06
1934.....	1,562	36,439	23 33
1935.....	1,812	80,513	44 43
1936.....	1,916	96,311	50 27
1937.....	1,782	94,405	52 97
1938.....	3,049	155,420	50 97

COD LIVERS

There was an increase during the year in the quantity of cod livers landed by Canadian vessels, although the average price shows some reduction.

The statement following reviews cod liver returns for the past six years:—

Year	Cwts.	Marketed Value	Average Value per Cwt.
		\$	\$ cts.
1933.....	385	7,781	20 21
1934.....	825	16,772	20 33
1935.....	1,127	43,367	38 48
1936.....	1,430	59,654	41 72
1937.....	1,017	40,238	39 57
1938.....	1,403	49,368	35 19

GRAYFISH LIVERS

During the year there was a considerable increase in the landings of grayfish livers, although towards the end of the year market conditions were not altogether satisfactory. The average price was \$6.37 per hundredweight compared with \$6.15 per hundredweight in the previous season, as shown by the following statement:—

Year	Cwts.	Marketed Value	Average Value per Cwt.
		\$	\$ cts.
1937.....	1,739	10,702	6 15
1938.....	7,894	50,277	6 37

SHRIMPS

Although there are substantial quantities of shrimps available along the coast of British Columbia the market conditions have been such in recent years that there has been only partial exploitation of the resources. It is possible that in the near future conditions may change to such a degree as to lead to a larger annual harvest being taken.

Shrimp landings for the past seven years are shown in the following statement:—

Year	Marketed Fresh	Canned
	cwts.	cases
1932.....	1,109	209
1933.....	1,247	35
1934.....	933	336
1935.....	1,545	483
1936.....	646	25
1937.....	652	222
1938.....	864	460

HERRING

Catches of herring on the west coast of Vancouver Island were disappointing, apart from Quatsino, where a good run appeared. It was only in this area that the full quota of 5,000 tons could be safely permitted.

The quota system in District No. 3 was again enforced during 1938 and appears to have functioned satisfactorily.

Prospecting by seiners in the northern area, that is, District No. 2, resulted in no new particularly large concentrations of herring being found, save in Prince Rupert harbour. Fairly good showings of herring were observed in some parts of the district but the fish were not sufficiently numerous to justify seining. For some reason or other herring did not show in large quantities in Cousins inlet up to the end of the year.

HERRING—DRYSALTED

From Statement No. 8 it will be observed that the pack of drysalted herring during the year was only 149,700 hundredweights—the smallest output for many years. The decrease was due, not to lack of fish, but entirely to the chaotic conditions obtaining in China, which made marketing arrangements very difficult. The drysalting operations were again entirely under the control of the British Columbia Salt Fish Board.

PILCHARDS

Due to the erratic movements of the fish, the success of each season's pilchard fishery operations is always speculative. In some seasons the pilchards are to be found within a few miles of the processing plants; in others, the operators have to send their boats to the extra-territorial waters off the State of Washington. During the first part of the 1938 season pilchard did not occur off British Columbia shores and were only available in the vicinity of Destruction island, some fifty miles south of cape Flattery. As the season advanced, however, the fish came in off British Columbia, reasonably close to the Canadian plants, and this condition permitted the processing of a fairly satisfactory quantity at reasonable cost.

It will be observed from Statement No. 9 that the pack of canned pilchards is the largest since 1939.

CLAMS

There was a considerable increase in the quantity of clams marketed, both fresh and canned clams, as shown by the following statement. This increase was due largely to the working of the razor clam beds along the north coast of the Queen Charlotte Islands:—

Year	Marketed Fresh	Canned
	cwts.	cases
1934.....	6,332	5,815
1935.....	15,716	10,209
1936.....	26,530	12,579
1937.....	27,018	12,587
1938.....	37,103	22,155

CRABS

The demand for British Columbia canned crabs continues to increase, as can easily be understood by anyone who is familiar with the high quality of this particular pack.

The following statement shows the disposition of the crab catch during the past eleven years:—

Year	Marketed Fresh	Canned
	cwts.	cases
1928.....	5,878	.....
1929.....	5,496	671
1930.....	4,459	295
1931.....	4,968	204
1932.....	2,952	251
1933.....	3,766	999
1934.....	3,187	1,267
1935.....	4,336	1,322
1936.....	4,347	1,312
1937.....	4,948	1,546
1938.....	4,337	2,157

WHALES

Whilst apparently there was no shortage of whales, weather conditions were again quite bad in 1938, particularly from the standpoint of prevalence of fog. The whaling company employed during the season 130 men at their two stations situated at Naden harbour and Rose harbour, respectively. Six whaling boats were used.

The provisions of the international agreement in respect of whaling were closely observed.

Statement No. 11 shows the whale catch since 1922.

FISH MEAL AND OIL

Generally speaking, a fairly satisfactory season was enjoyed in the production of fish meal and oil. An increase in the production of oil was noted in the case of pilchards and while the output of herring oil showed reduction from that of the previous season, it was the second largest in the history of the industry. This was due largely to the fact that during the past two years new sources of herring supply have been found in the northern areas.

FUR SEAL SKINS

Fur seal skins taken during the year, 1,367, show a reduction of approximately fifty per cent as compared with the take of the previous year. The decrease was due to several causes, the principal being weakness of demand which resulted in the low price of \$2.25, difficult weather conditions during the migration of the fur seals past the British Columbia coast were another adverse factor.

Statement No. 12 shows the number of fur seals taken since 1912.

DESTRUCTION OF SEA LIONS

While the main sea lion hunt was again carried on by C.G.S. *Givenchy*, the practice of having other fishery vessels destroy lions as opportunity occurred was also followed. Some lions were destroyed both by C.G.S. *Malaspina* and F.P.L. *Vanidis*. The following statement shows the total number destroyed by the three boats during the year:—

Where Destroyed	Adults	Pups	Totals
Entrance Island.....	62	.....	62
Nanoose Bay.....	95	.....	95
Thormanby Island.....	64	.....	64
Long Beach Rocks.....	270	.....	270
Raphael Point Rock.....	3	.....	3
Langara Island.....	72	.....	72
Solander Rocks.....	66	.....	66
North Danger Rocks.....	122	.....	122
Banilla Rocks.....	68	.....	68
Virgin Rocks.....	21	4	25
East Haycock Island.....	605	256	861
West Haycock Island.....	354	513	867
Pearl Rocks.....	27	2	29
White Cliff Island.....	88	.....	88
Butterworth Rocks.....	38	.....	38
Totals.....	1,955	775	2,730

It will be noted that the largest numbers of lions were destroyed at the East and West Haycock islands where operations were first undertaken in 1937. Only a few were killed at the Virgin and Pearl rocks where previously great numbers had usually congregated. Early operations by the *Givenchy* had greatly curbed the size of the herds at these points.

An experiment was carried on during the year by a commercial firm with a view to ascertaining the suitability of sea lion hides for making leather gloves. In this experiment some 346 lions, in addition to the number shown in the fore-

going statement were killed at East Haycock island, and their hides tanned. The success, or otherwise, of this experiment has not yet been fully determined as information regarding the reaction of the market to the finished product is not yet available.

A census of the sea lion population of the British Columbia coast was undertaken during the year and it is estimated that the number frequenting the various areas is 14,833. It is to be kept clearly in mind, that owing to the roving propensities of these mammals, the number should only be accepted as an estimate.

HAIR SEALS

The total amount paid out in British Columbia from April 1, 1938, to December, 31, 1938, in bounties on hair seals was \$8,835. The following statement shows the amounts paid as hair seal bounties in British Columbia since 1914-15.

Fiscal Year	Hair Seals		
	Rate	Number	Amount
	\$ cts.		\$ cts.
1914-1915.....	3 50	2,237	7,829 50
1915-1916.....	1 00	749	749 00
1916-1917.....	1 00	785	785 00
1917-1918.....	1 00	748	748 00
1927-1928.....	3 50	567	1,984 50
1928-1929.....	3 50	3,209	11,231 50
1929-1930.....	2 50	5,944	14,860 00
1930-1931.....	2 50	6,308	15,770 00
1931-1932.....	2 50	6,084	15,210 00
1932-1933.....	2 00	4,300	8,600 00
1933-1934.....	1 50	400	600 00
1936-1937.....	1 50	1,933	2,899 50
1937-1938.....	2 50	4,295	10,737 50
1938-1939.....	2 50	4,569	11,422 50
Total.....		42,128	103,427 00

ENGINEERING WORK

In Appendix No. 3 of this report will be found reference to the work which engaged the attention of the engineering branch of the department's British Columbia Service during the year.

VIOLATIONS

There was a total of 258 prosecutions for violation of the fishery regulations during the year, with resultant revenue of \$10,158.32, as shown by the following statement:—

	District No. 1	District No. 2	District No. 3	Total
Prosecutions.....	92	83	83	258
Fines.....	\$ 2,527 00	\$ 2,675 00	\$ 1,828 00	\$ 7,030 00
Sales.....	\$ 488 41	\$ 2,193 76	\$ 446 15	\$ 3,128 32
Total Fines and Sales.....	\$ 3,015 41	\$ 4,868 76	\$ 2,274 15	\$ 10,158 32

PATROL SERVICE

There were 21 departmentally owned power craft, including two steam vessels, 85 chartered gasoline boats and 12 row boats, employed in the patrol service in 1938, in addition to seaplanes, as shown by the following statement:—

1938	Number	Total
<i>Departmentally owned—</i>		
<i>Malaspina and Givenchy (steam).....</i>	2	.....
District No. 1 (gas and Diesel).....	5	.....
District No. 2 (gas and Diesel).....	10	.....
District No. 3 (gas and Diesel).....	4	21
<i>Chartered boats—</i>		
District No. 1 (gas and Diesel).....	3	.....
District No. 2 (gas and Diesel).....	28	.....
District No. 3 (gas and Diesel).....	54	85
District No. 1 (row).....	.....	.....
District No. 2 (row).....	4	.....
District No. 3 (row).....	8	12
		118

Aerial patrol covered 303 hours, 30 minutes, as shown below:—

Base	Hours	Minutes
Alert Bay.....	97	55
Nanaimo.....	45	00
Swanson Bay.....	153	10
Vancouver.....	7	25
	303	30

(A statement showing the flying time in preceding years will be found in the chief supervisor's report in the annual departmental report for 1937-38.)

The 'planes used during the season just closed were two Bellanca "Pacemaker" cabin seaplanes, one Waco cabin seaplane, and one Boeing "Totem" flying boat. The two Bellancas were the regular equipment but were relieved from time to time by the other two.

NEW PATROL BOATS

In an effort to handle patrol service in rivers as efficiently as possible, and at a reduced cost, an effort is being made to replace the larger and more expensive patrol boats by small, two-man boats having greater speed and more shallow draft. In this way much more territory can be covered and, with the shallow draft, it is possible to cover portions of the Fraser river, for instance, where, in the past, protection has not proved sufficient.

During the year one boat of the smaller type was built by the department's staff at Poplar Island plant at New Westminster. The hull of this craft is of the Fraser River fishing boat type. It is 33 feet in length and of 7-foot beam, and its draft 30 inches. The boat is powered with an 8-cylinder marine engine, equipped with Joe's reverse gears. This season's experience has shown that this type of boat justifies expectations.

After having been employed in the fisheries protection service in British Columbia for many years, the steam vessel *Givenchy*, built in Montreal in 1918 as a minesweeper, has outlived her usefulness and it has been decided to take

her out of commission at the end of the fiscal year and to replace her by a new boat. The *Givenchy* has been used in protecting the three mile limit, preventing misuse of Canadian harbours by foreign boats, protecting the halibut fisheries, protecting the fur seal herd in its annual migration to the Pribiloff Islands, and in other work connected with the fisheries. The new vessel, now under construction under a contract placed with a shipbuilding firm at New Westminster, will have an overall length of 107 feet 6 inches, 18-foot beam and its moulded depth will be 11 feet 3 inches. The vessel has been designed by a British Columbia architect who has had many years' experience in designing boats suited to conditions obtaining on the coast of the province. She will be equipped with a 320 H.P. full diesel engine and will have a guaranteed cruising speed of twelve knots. The wood being used in her construction is yellow cedar and Douglas fir, with the usual percentage of white oak and Australian red gumwood. The new vessel is expected to go in commission about the end of the fiscal year.

With a view to a further increase in the efficiency of the protection service in open waters, a second boat is also being constructed for the department, this one at Vancouver. This vessel, like the other, is expected to be available for service by the end of the fiscal year. The boat will be 87 feet in length, 15 feet 6 inches in beam, with a moulded depth of 10 feet, and will be equipped with a full diesel engine of 180 H.P. The engines for both of the new vessels are of Vancouver manufacture.

DEPARTMENTAL STAFF

Those employed during the year in the several capacities were as follows:—

Supervisors, inspectors and clerical staff	57
General, (inspection of spawning grounds, etc.)	20
Guardians	46
Patrolmen and boat crews	206
Fish culture	3
Removal of obstructions	36
	<hr/>
	368

SPORT FISHING—TIDAL WATERS

Sport fishing in tidal waters, by means of trolling and fly casting, was very successful during the year. The blueback fishing was satisfactory, although not uniformly successful; for instance, the small man operating with a rowboat, and those fishing with small gas boats, with light gear, were not so successful as those who operated with heavier gear in deeper water. It has been suggested that the unusually dry warm summer resulted in the fish seeking greater depth and thus being unavailable to sportsmen who fish near the surface as a rule.

There was a remarkable increase in the size of the individual fish, both in the case of bluebacks and cohoes.

ANNUAL CANNED SALMON PRODUCTION IN BRITISH COLUMBIA

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Pack canned									
		G.N.				T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	Totals
		Troll	P.S.	D.S.												
1925	65	4,225	1,821	329	37	19	cases 392,643	cases 39,142	cases 4,419	cases 29,938	cases 10,675	cases 1,996	cases 188,505	cases 445,400	cases 607,904	cases 1,720,922
1926	76	4,750	2,416	445	41	6	cases 336,995	cases 41,276	cases 4,177	cases 23,736	cases 19,445	cases 2,165	cases 162,449	cases 772,993	cases 701,962	cases 2,065,198
1927	76	5,637	3,093	555	46	7	cases 308,032	cases 34,029	cases 8,819	cases 16,129	cases 20,820	cases 1,462	cases 161,148	cases 247,617	cases 562,109	cases 1,360,449
1928	62	5,179	2,987	399	22	7	cases 203,541	cases 11,002	cases 2,328	cases 5,526	cases 6,073	cases 865	cases 150,684	cases 792,362	cases 863,257	cases 2,035,636
1929	63	5,609	2,630	371	24	7	cases 281,306	cases 8,295	cases 3,156	cases 7,926	cases 22,246	cases 672	cases 174,198	cases 477,969	cases 424,982	cases 1,400,750
1930	59	6,061	3,115	343	21	7	cases 477,678	cases 20,184	cases 6,650	cases 11,970	cases 42,033	cases 1,656	cases 148,561	cases 1,111,937	cases 401,114	cases 2,221,783
1931	35	4,893	3,115	228	21	7	cases 291,464	cases 17,526	cases 4,727	cases 4,894	cases 25,296	cases 1,326	cases 76,879	cases 206,995	cases 55,997	cases 685,104
1932	44	5,359	3,033	157	30	7	cases 284,355	cases 46,953	cases 14,133	cases 14,974	cases 28,505	cases 1,168	cases 160,466	cases 223,716	cases 306,761	cases 1,081,031
1933	49	6,113	2,880	238	31	8	cases 258,107	cases 12,464	cases 1,849	cases 5,953	cases 21,763	cases 1,459	cases 137,289	cases 532,558	cases 293,630	cases 1,265,072
1934	49	6,826	3,099	296	9	8	cases 377,882	cases 15,281	cases 1,644	cases 12,859	cases 29,556	cases 1,282	cases 195,874	cases 435,364	cases 513,184	cases 1,582,926
1935	43	6,216	3,107	293	9	8	cases 350,444	cases 10,187	cases 3,114	cases 8,619	cases 15,319	cases 596	cases 216,173	cases 514,966	cases 409,604	cases 1,529,022
1936	46	6,620	3,511	287	9	7	cases 415,024	cases 16,493	cases 2,527	cases 10,894	cases 33,718	cases 1,068	cases 212,343	cases 591,532	cases 597,487	cases 1,881,026
1937	32	6,095	3,162	291	9	5	cases 325,774	cases 10,963	cases 1,788	cases 3,420	cases 19,236	cases 844	cases 113,972	cases 585,576	cases 447,602	cases 1,509,175
1938	38	7,125	3,453	300	9	5	cases 447,453	cases 10,276	cases 2,322	cases 2,933	cases 27,417	cases 1,035	cases 273,706	cases 400,876	cases 541,812	cases 1,707,830

NOTE.—Licences issued include transfers from one district to another, except in the case of purse seines after 1929.

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued				Pack canned								Totals	
		C.N. Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink		Chum
						cases	cases	cases	cases	cases	cases	cases	cases	cases	cases
*1925.....	3	210	.....	.....	.....	20,351 5,441	387 538	.....	.....	.....	470 8,188	.....	35,880 23,497	.....	94,752
†1925.....	.....	.....	.....	.....	.....	18,945 4,067	387 392	.....	.....	.....	457 7,726	.....	34,530 22,504	.....	89,008
*1926.....	4	316	.....	.....	.....	15,929 4,616	751 597	.....	.....	.....	375 4,274	.....	43,891 15,392	.....	85,825
†1926.....	.....	.....	.....	.....	.....	15,929 4,616	751 597	.....	.....	.....	375 4,274	.....	50,815 15,392	.....	92,749
*1927.....	4	302	.....	.....	.....	11,986 3,221	511 213	.....	.....	.....	96 3,845	.....	16,609 3,307	.....	39,788
†1927.....	.....	.....	.....	.....	.....	11,986 3,221	511 213	.....	.....	.....	96 3,845	.....	16,609 3,307	.....	39,788
*1928.....	3	263	.....	.....	.....	5,558 1,471	68 615	.....	.....	.....	36 18,002	.....	95,998 4,591	.....	126,339
†1928.....	.....	.....	.....	.....	.....	5,540 1,471	68 307	.....	.....	.....	36 10,734	.....	83,183 3,538	.....	104,877
*1929.....	3	240	.....	.....	.....	16,347 256	57 96	.....	.....	.....	.....	.....	10,507 1,261	.....	29,719
†1929.....	.....	.....	.....	.....	.....	16,077 256	57 96	.....	.....	.....	.....	.....	10,342 1,212	.....	29,185
*1930.....	3	282	.....	.....	.....	26,500 1,772	283 176	.....	.....	.....	137 5,555	.....	90,163 4,330	.....	128,916
†1930.....	.....	.....	.....	.....	.....	26,405 1,722	283 176	.....	.....	.....	84 961	.....	79,976 3,853	.....	113,460
*1931.....	1	235	.....	.....	.....	16,929 1,010	323 106	.....	.....	.....	.....	.....	5,178 660	.....	33,149
†1931.....	.....	.....	.....	.....	.....	9,146 1,010	323 106	.....	.....	.....	.....	.....	3,575 392	.....	14,995
*1932.....	3	278	.....	.....	.....	15,138 5,848	264 468	.....	.....	.....	23 33,495	.....	51,920 15,070	.....	122,226
†1932.....	.....	.....	.....	.....	.....	14,154 3,676	264 468	.....	.....	.....	40 7,955	.....	44,629 14,515	.....	85,671
*1933.....	3	297	.....	.....	.....	10,173 1,014	227 214	.....	.....	.....	114 19,016	.....	57,406 2,778	.....	90,942
†1933.....	.....	.....	.....	.....	.....	9,757 885	227 184	.....	.....	.....	49 3,251	.....	44,306 1,775	.....	60,434
*1934.....	3	335	.....	.....	.....	36,242 533	126 145	.....	.....	.....	311 26,698	.....	37,698 5,558	.....	107,311
†1934.....	.....	.....	.....	.....	.....	28,701 383	126 145	.....	.....	.....	311 9,935	.....	32,965 2,648	.....	75,214
*1935.....	3	310	.....	.....	.....	12,712 94	298 168	.....	.....	.....	143 21,810	.....	25,508 17,481	.....	78,214
†1935.....	.....	.....	.....	.....	.....	12,245 86	298 168	.....	.....	.....	143 5,125	.....	21,443 12,681	.....	52,189
*1936.....	3	349	.....	.....	.....	28,562 1,622	229 316	.....	.....	.....	496 11,842	.....	72,022 20,196	.....	135,285
†1936.....	.....	.....	.....	.....	.....	24,137 520	188 237	.....	.....	.....	496 8,439	.....	60,582 16,504	.....	111,103
*1937.....	2	321	.....	.....	.....	17,590 773	245 232	.....	.....	.....	46 12,336	.....	7,876 10,530	.....	49,628
†1937.....	.....	.....	.....	.....	.....	11,630 773	245 232	.....	.....	.....	46 316	.....	5,688 6,009	.....	24,839
*1938.....	2	309	.....	.....	.....	21,746 458	189 125	.....	.....	.....	188 20,485	.....	61,660 15,135	.....	119,986
†1938.....	.....	.....	.....	.....	.....	14,795 13	165 125	.....	.....	.....	188 3,986	.....	29,843 6,804	.....	55,919

* Pack of fish caught at Naas river regardless where canned.

† Pack of Naas river regardless where caught.

NOTE.—Licences issued, except 1925, include transfers from other districts.

REPORT OF THE DEPUTY MINISTER

Year	Num-ber of can-eries oper-ated	Number of salmon licences issued				Pack canned									
		G.N. Troll	P.S.	D.S.	T.N.	Stockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	Totals
†1925	13	1,067				77,785	17,811	1,657	2,457		700	38,029	127,226	10,687	276,352
†1925						81,149	19,185	1,657	2,603		713	39,168	130,083	74,308	348,866
†1926	15	1,129				82,307	17,896	966	1,750		764	30,153	170,586	46,382	350,804
†1926						82,357	17,896	966	1,750		764	30,209	210,064	63,527	407,553
†1927	13	1,195				83,988	13,595	3,567	1,609		646	25,209	38,903	9,656	177,173
†1927						83,984	14,856	3,567	1,609		580	25,623	38,761	18,659	187,639
†1928	11	1,208				84,524	4,121	988	397		231	18,751	191,812	11,792	262,616
†1928						84,559	5,043	988	354		241	30,194	209,579	17,751	298,709
†1929	11	1,143				77,714	3,795	441	383		13	37,138	94,846	3,625	217,955
†1929						78,014	3,795	441	383		13	37,456	95,305	4,835	220,242
†1930	11	1,202				130,952	6,589	1,047	322		60	24,191	214,266	3,327	380,754
†1930						132,372	6,674	1,047	324		58	29,203	275,642	5,057	450,377
†1931	8	1,076				107,936	7,040	2,284	534		768	20,146	41,264	3,893	183,865
†1931						93,029	7,040	2,284	534		768	10,737	44,807	3,610	162,809
†1932	10	1,119				59,916	16,378	9,419	2,472		404	48,312	58,261	38,549	233,711
†1932						52,624	14,268	9,419	2,472		365	20,549	32,519	28,756	160,972
†1933	10	1,218				30,506	2,626	444	227		267	39,896	95,783	15,714	185,463
†1933						27,693	6,805	444	828		201	21,366	79,932	10,970	148,239
†1934	9	1,164				70,654	6,844	592	860		114	54,470	125,163	24,388	283,085
†1934						54,558	6,809	592	860		131	21,298	27,628	6,242	118,118
†1935	9	1,053				64,140	3,443	429	188		12	45,512	99,412	31,807	244,943
†1935						52,879	3,422	429	188		14	23,498	81,868	8,122	170,420
†1936	8	970				97,823	4,883	455	435		33	55,198	178,299	36,892	374,018
†1936						81,960	3,781	414	336		33	32,142	92,997	15,343	227,026
†1937	7	850				55,811	3,788	382	315		21	34,502	72,455	37,431	204,705
†1937						41,023	3,704	382	315		21	14,575	57,623	10,927	127,668
†1938	6	1,049				73,598	3,361	1,165	259		42	100,658	146,676	34,785	360,454
†1938						46,988	2,916	1,141	259		42	38,542	69,299	14,668	173,855

† Pack of fish caught at Skeena river regardless where canned.

‡ Pack at Skeena river regardless where caught.

NOTE.—Licences issued include transfers from other districts.

Year	Number of canneries operated	Number of salmon licences issued					Packs canned									
		C. N.	Troll	P. S.	D. S.	T. N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum	Totals
							cases	cases	cases	cases	cases	cases	cases	cases	cases	cases
1925	11	1,127					201,186	344	311	116		10	4,887	7,675	11,501	226,030
1926	12	1,483					170,581	215	249	57			4,866	8,625	11,477	196,132
1927	13	1,842					89,866	535	249	160		27	10,348	8,493	14,690	124,368
1928	11	1,541					74,629	473	189	142		11	7,448	13,503	11,751	108,146
1929	13	1,842					101,053	463	530	321		19	5,475	1,383	5,027	114,271
1930	12	1,833					87,145	322	530	321		17	4,980	1,402	3,617	98,324
1931	5	1,433					93,361	458	443	157		13	9,761	3,130	9,200	116,523
1932	10	1,754					88,876	156	443	152		13	1,098	16,703	3,626	111,066
1933	13	1,577					79,548	546	215	127		47	8,270	3,112	6,536	98,401
1934	12	1,833					77,669	140	239	107		41	3,239	1,340	1,091	83,866
1935	10	1,754					150,398	614	383	229		182	6,760	17,476	18,372	194,414
1936	10	1,754					141,684	275	383	215		208	2,084	34,638	2,135	181,622
1937	5	1,433					92,872	218	61	183		69	5,536	2,296	544	101,779
1938	11	2,318					80,732	200	82	165		68	6,683	3,724	562	92,216
1939	10	1,754					86,110	405	236	145		56	11,871	4,305	5,516	108,644
1940	11	2,318					85,358	128	236	143		49	7,335	4,631	1,109	98,989
1941	11	1,962					119,548	606	108	243		153	9,078	11,658	8,932	150,226
1942	11	2,318					114,045	454	108	241		169	8,514	25,054	9,518	158,103
1943	11	2,318					89,375	532	82	129		121	11,862	2,928	14,375	119,604
1944	11	2,318					82,828	390	82	128		122	8,793	9,769	16,444	118,556
1945	8	2,023					166,686	138	352	155		63	9,576	8,966	19,563	205,499
1946	8	2,210					129,531	94	306	146		49	917	6,045	7,128	144,216
1947	8	2,210					59,138	317	132	162		60	7,432	6,497	13,158	86,896
1948							48,803	315	131	148		54	7,683	17,254	10,921	79,309
1949	6	1,875					108,170	377	396	235		75	6,374	7,973	18,894	142,494
1950	6	2,261					91,399	335	462	233		76	5,331	18,873	21,931	138,631
1951	6	2,261					122,093	744	181	359		169	17,527	10,827	15,832	167,732
1952							86,490	716	136	351		99	14,284	12,447	17,102	131,625

NOTE.—Figures shown in roman are packs from fish caught at Rivers inlet or Smiths inlet. Figures shown in italics are actual packs irrespective of where fish taken and not including fish shipped out for canning in other districts. Licences issued include transfers from other districts.

STATEMENT No. 5

PACK OF CANNED SALMON IN THE FRASER RIVER DISTRICT—1925 to 1938

Year	Num-ber of can-neries oper-ated	Number of salmon licences issued					Pack canned										Totals
		G.N.	Troll	P.S.	D.S.	T.N.	Sockeye	Red Spring	Pink Spring	White Spring	Blue-back	Steel-head	Coho	Pink	Chum		
1925.....	10	969	50				cases 31,523	cases 7,335	cases 873	cases 25,482	cases 5,107	cases 45	cases 36,717	cases 99,800	cases 66,111	cases 272,993	
1926.....	10	1,063	59				83,589	11,774	1,030	20,130	14,036	39	21,787	32,256	88,493	273,134	
1927.....	10	1,249	111				57,085	6,553	1,351	10,493	10,621	37	24,079	102,535	67,259	280,013	
1928.....	8	1,303	109				26,530	1,173	248	3,661	795		27,061	2,881	193,106	255,455	
1929.....	9	1,473	113				60,407	2,984	912	5,977	11,960	53	40,540	158,290	144,208	425,331	
1930.....	8	1,523	115				107,896	8,300	3,066	9,761	27,857	22	25,535	30,754	68,946	282,137	
1931.....	7	1,358	154				54,688	5,970	1,185	3,187	14,697	4	13,468	21,534	948	115,681	
1932.....	8	1,446	166				83,447	19,994	3,622	11,020	16,558	23	28,685	9,813	45,100	218,262	
1933.....	10	1,685	110	64			53,481	5,701	426	4,554	13,299		25,715	143,058	77,330	323,564	
1934*.....	11	1,803	98	105			145,579	5,495	263	11,072	22,566		30,751	35,847	219,331	470,904	
1934†.....							133,159	4,713	173	10,760	1,607		10,991	342	103,081	264,826	
1935*.....	10	1,663	124	108			76,415	5,181	326	6,783	7,701		63,933	182,528	72,353	415,220	
1935†.....							57,212	4,205	212	4,984	350		24,600	111,328	8,227	211,118	
1936*.....	11	1,784	118				165,651	7,128	461	8,426	20,647	6	51,243	23,842	188,538	465,942	
1936†.....							164,408	6,680	310	8,142			22,572	2	30,663	232,777	
1937*.....	10	2,082	190	58			103,137	3,877	226	1,940	19,065	15	25,618	252,416	119,254	525,548	
1937†.....							66,583	3,622	84	1,738	1,354	15	11,242	87,897	20,934	193,469	
1938*.....		2,319	190	112			217,882	4,592	413	1,532	21,923	72	54,314	29,862	181,444	512,034	
1938†.....							169,430	3,754	32	508		13	28,687	63	49,835	232,322	

* Represents actual pack, regardless where caught.

† Represents pack of Fraser fish, regardless where canned.

NOTE.—Licences issued include transfers from other districts.

NOTE.—1936† pack of Sockeye on Fraser, 164,408 cases, does not include 16,611 cases Sockeye caught on Fraser and exported and canned in Puget Sound canneries.

DEPARTMENT OF FISHERIES

STATEMENT No. 6

PACK OF CANNED SALMON OF PUGET SOUND, U.S.A., FROM 1925 TO 1938

Year	Number of canneries operated	Spring	Sockeye	Coho	Chum	Pink	Steel- head	Total
		cases	cases	cases	cases	cases	cases	cases
1925.....	23	28,268	106,064	171,587	41,635	555,848	141	903,543
1926.....	14	27,763	44,569	120,846	112,411	2,125	63	307,777
1927.....	21	43,443	96,343	133,528	37,414	585,506	216	896,450
1928.....	12	24,628	61,044	92,770	145,735	5,816	265	330,258
1929.....	21	32,600	111,855	101,363	150,867	727,748	280	1,124,713
1930.....	13	29,378	352,194	122,691	64,234	3,712	397	572,606
1931.....	18	28,066	83,728	76,025	55,189	705,580	293	948,881
1932.....	10	23,964	78,319	60,740	146,151	1,677	60	310,911
1933.....	19	20,869	125,738	44,568	37,039	543,340	222	771,776
1934.....	20	14,398	352,579	69,254	73,337	3,606	.....	513,174
1935.....	14	9,737	54,677	71,985	15,604	377,445	.....	529,448
1936.....	9	6,328	59,505	29,191½	80,831½	1,345	.....	177,201
1937.....	14	8,968	60,259	32,559	17,417	327,833	.....	447,036
1938.....	13	2,787½	134,651	9,820½	7,852½	193	.....	155,304½

STATEMENT No. 7

STATEMENT OF HALIBUT LANDINGS—BRITISH COLUMBIA—1913 TO 1938

(Includes landings in United States bottoms)

	Cwt.		Cwt.
1913.....	223,465	1926.....	315,095
1914.....	214,444	1927.....	271,354
1915.....	194,896	1928.....	302,820
1916.....	123,062	1929.....	304,364
1917.....	113,529	1930.....	254,796
1918.....	186,229	1931.....	182,005
1919.....	210,777	1932.....	168,847
1920.....	238,770	1933.....	170,372
1921.....	325,868	1934.....	182,602
1922.....	293,184	1935.....	171,143
1923.....	334,667	1936.....	168,121
1924.....	331,382	1937.....	187,425
1925.....	318,240	1938.....	193,488

STATEMENT No. 8

STATEMENT OF DRY SALT HERRING PACKS, 1918-1938—BRITISH COLUMBIA

Year	District No. 1	District No. 2	District No. 3		Total
			East Coast	West Coast	
	cwt.	cwt.	cwt.	cwt.	cwt.
1918.....	20,000	.....	109,900	42,710	172,610
1919.....	4,000	.....	43,000	208,058	255,058
1920.....	807	1	176,640	334,720	512,168
1921.....	249	.....	231,240	248,482	479,971
1922.....	.....	.....	297,871	224,897	522,768
1923.....	.....	8,935	250,420	484,681	744,036
1924.....	.....	.....	305,266	548,277	853,543
1925.....	.....	4,120	591,162	487,892	1,083,174
1926.....	11,134	4,192	596,114	327,207	938,647
1927.....	24,380	7,600	542,385	473,825	1,048,190
1928.....	46,995	.....	748,032	277,161	1,072,188
1929.....	78,800	5,160	691,673	140,751	916,384
1930.....	19,114	.....	546,342	240,517	805,973
1931.....	.....	.....	668,506	119,721	788,227
1932.....	.....	.....	219,398	50,022	269,420
1933.....	.....	.....	448,944	64,080	513,024
1934.....	.....	.....	310,026	104,600	414,626
1935.....	.....	.....	280,290	22,420	302,710
1936.....	.....	.....	357,337	26,000	383,337
1937.....	.....	.....	203,401	.....	203,401
1938.....	.....	.....	149,700	.....	149,700

STATEMENT No. 9

CANNED PILCHARD PACK—BRITISH COLUMBIA—1917 TO 1938

Cases		Cases	
1917.....	1,090	1928.....	65,097
1918.....	63,693	1929.....	98,821
1919.....	63,065	1930.....	55,166
1920.....	91,929	1931.....	17,336
1921.....	16,091	1932.....	4,622
1922.....	19,186	1933.....	2,946
1923.....	17,195	1934.....	35,437
1924.....	14,898	1935.....	27,184
1925.....	37,182	1936.....	35,007
1926.....	26,731	1937.....	40,975
1927.....	58,501	1938.....	69,473

STATEMENT No. 10

PRODUCTION FISH OIL AND MEAL—BRITISH COLUMBIA, 1920-1938

Year	From Pilchards		From Herring		From Whales			From Other Sources*	
	Meal and fertilizer	Oil	Meal	Oil	Whale-bone and meal	Fertilizer	Oil	Meal and fertilizer	Oil
	tons	gals.	tons	gals.	tons	tons	gals.	tons	gals.
1920.....					503	1,035	604,070	466	55,669
1921.....								489	44,700
1922.....					326	230	283,314	911	75,461
1923.....					485	910	706,514	823	180,318
1924.....					292	926	645,657	1,709	241,376
1925.....	2,083	495,653			347	855	556,939	2,468	354,853
1926.....	8,481	1,898,721	310	13,700	340	666	468,206	1,752	217,150
1927.....	12,169	2,673,876	1,838	170,450	345	651	437,967	2,512	375,130
1928.....	14,500	3,995,806	831	68,411	376	754	571,914	3,658	411,207
1929.....	15,826	2,856,579	932	34,924	416	779	712,597	3,671	461,915
1930.....	13,934	3,204,058	915	60,373	273	581	525,533	2,420	182,636
1931.....	14,200	2,551,914	3,904	110,810				1,747	241,682
1932.....	8,842	1,315,864	6,195	186,173				413	45,517
1933.....	1,108	275,879	4,078	316,213	249	223	509,310	1,596	187,560
1934.....	7,626	1,635,123	2,570	104,710	340	631	813,724	2,458	337,025
1935.....	8,681	1,649,392	5,262	306,767	211	354	426,772	2,147	247,437
1936.....	8,715	1,217,097	10,985	782,499	332	687	763,740	3,148	335,969
1937.....	8,483	1,707,276	14,427	1,283,658	268	527	662,355	2,720	294,546
1938.....	8,891	2,195,850	9,624	929,158	273	490	543,378	2,491	228,157

* Salmon and halibut offal and gray fish.

STATEMENT No. 11

NUMBER OF WHALES LANDED—BRITISH COLUMBIA, 1922-1938*

Species	1922	1923	1924	1925	1926	1927	1928	1929	1930	1933	1934	1935	1936	1937	1938
Sperm.....	38	94	83	76	80	82	83	146	147	190	265	175	311	265	252
Sulphur.....	4	62	56	29	14	10	47	16	10	1		6	3	1	4
Fin.....	94	166	125	135	124	138	140	168	62	17	71	20	48	44	50
Hump.....	50	78	47	40	25	21	21	9	12		14	1	14	7	4
Sei.....	1	53	100	68	25	7	13	67	89	1			2		
Right.....			2		1										
Bottlenose.....		2	1	3			1	1							
Totals.....	187	455	414	351	269	258	305	407	320	209	350	202	378	317	310

* No whaling plants operated 1931 and 1932.

DEPARTMENT OF FISHERIES

STATEMENT No. 12

STATEMENT OF FUR SEAL SKINS TAKEN AND LANDED, BRITISH COLUMBIA, 1912-1938

Year	District No. 2	District No. 3	Total
	No.	No.	No.
1912.....		205	205
1913.....	285	119	404
1914.....	95	257	352
1915.....	39	400	439
1916.....	21	138	159
1917.....	14	204	218
1918.....	78	10	88
1919.....	53	17	70
1920.....	502	556	1,058
1921.....	270	2,079	2,349
1922.....	291	639	930
1923.....	678	3,746	4,424
1924.....	370	1,862	2,232
1925.....	810	3,655	4,465
1926.....	655	2,169	2,824
1927.....	188	1,288	1,476
1928.....	465	1,625	2,090
1929.....	1,119	2,264	3,383
1930.....	195	2,102	2,297
1931.....	76	1,387	1,463
1932.....	88	1,699	1,787
1933.....	237	1,747	1,984
1934.....	98	158	256
1935.....	63	778	841
1936.....		1,888	1,888
1937.....		2,671	2,671
1938.....		1,367	1,367

STATEMENT No. 13

STATEMENT OF LICENCES ISSUED FOR SALMON CANNERIES AND SALMON FISHING GEAR (NOT INCLUDING LICENCES TO CAPTAINS AND ASSISTANTS ON SALMON SEINE-BOATS OR ASSISTANTS ON SALMON GILL-NET BOATS.) BRITISH COLUMBIA—1927-1938

Kind of Licence	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
<i>District No. 1—</i>												
Salmon cannery.....	10	10	9	11	7	8	10	11	10	11	10	10
Salmon trolling.....	111	109	113	115	154	166	110	98	124	118	190	190
Salmon gill-net.....	1,249	1,303	1,473	1,523	1,358	1,446	1,685	1,803	1,663	1,784	2,082	2,319
<i>District No. 2—</i>												
Salmon cannery.....	48	47	45	26	21	28	29	31	26	27	20	22
Salmon trap-net.....												
Salmon purse-seine.....	244	158	153	152	71	53	55	109	102	99	82	100
Salmon drag-seine.....	16	9	9	9	9	9	11	9	9	9	9	9
Salmon trolling.....	938	864	738	891	884	875	882	937	930	964	916	958
Salmon gill-net:—												
Lowe inlet.....						29	59	67	58	74	76	80
Nass river.....	302	263	246	282	235	278	297	335	310	349	321	309
Skeena river.....	1,198	1,208	1,143	1,202	1,076	1,119	1,218	1,164	1,053	970	856	1,049
Rivers Inlet.....	1,273	1,117	1,149	1,449	1,144	1,461	1,603	1,899	1,699	1,802	1,490	1,796
Smiths Inlet.....	570	424	428	384	289	293	359	419	324	408	385	465
Bella Coola.....	195	173	236	359	240	238	228	285	268	265	261	242
Kimsquit.....	104	80	194									
Butedale.....	108	58	56	71	51	55	43	48	41	57	18	80
Namu.....	180	77	116	142	108	100	107	141	129	146	137	159
Queen Charlotte islands.....	42	22	3	6	5	4	2	19		24	4	53
Total, salmon gill-net, District No. 2.....	3,972	3,422	3,571	3,895	3,148	3,577	3,916	4,377	3,882	4,095	3,548	4,233
<i>District No. 3—</i>												
Salmon cannery.....	18	19	17	17	7	8	10	7	7	8	7	6
Salmon trap-net.....	7	7	7	7	7	7	8	8	8	7	5	5
Salmon purse-seine.....	308	239	218	191	157	104	183	187	191	188	209	200
Salmon drag-seine.....	30	13	13	12	12	21	20					
Salmon trolling.....	2,045	2,014	1,779	2,109	2,077	1,992	1,888	2,064	2,053	2,429	2,056	2,305
Salmon gill-net.....	422	454	565	643	387	336	512	646	673	741	466	573
<i>Whole Province—</i>												
Salmon cannery.....	76	76	71	54	35	44	49	49	43	46	37	38
Salmon trap-net.....	7	7	7	7	7	7	8	8	8	7	5	5
Salmon purse-seine.....	552	397	371	243	228	157	236	296	293	287	291	300
Salmon drag-seine.....	46	22	22	21	21	30	31	9	9	9	9	9
Salmon trolling.....	3,094	2,987	2,630	3,115	3,115	3,033	2,880	3,099	3,107	3,511	3,162	3,453
Salmon gill-net.....	5,643	5,179	5,609	6,061	4,893	5,359	6,113	6,826	6,218	6,620	6,096	7,125

Note.—During the season 1928 F. Millard's cannery at Vancouver, the Cassiar cannery on the Skeena and the Massett Cannery, Massett inlet, operated without licences, and are not included in the number of cannery licences shown above.

Commencing with year 1930 salmon cannery licences shown above were issued by the Provincial Fisheries Department

STATEMENT No. 14

STATEMENT OF POWER BOATS OPERATED IN DISTRICT No. 2, BRITISH COLUMBIA, IN CONNECTION WITH SALMON GILL-NET OPERATIONS

—	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Naas river.....	3	9	35	21	37	34	119	142	179	233	268	243	327	278	287
Skeena river.....	18	64	133	162	216	263	472	603	660	668	732	804	842	824	817
Bella Coola and Kimsquit.....	1	12	49	47	90	103	70	124	89	101	156	150	139	161	169
Central area.....		8	28	87	13	73	68	111	111	165	234	161	252	244	323
Rivers inlet.....	54	110	254	248	479	435	712	682	776	901	1,233	1,164	1,287	1,122	1,294
Smiths inlet.....	9	39	131	110	204	135	231	176	175	219	299	285	302	328	387
Queen Charlotte Islands.....					10								24		
	85	242	630	675	1,049	1,010	1,658	1,765	1,990	2,287	2,922	2,807	3,173	2,957	3,277

STATEMENT No. 15

PACK OF SOCKEYE SALMON FROM RUNS TO FRASER RIVER, 1925-1938

Year	Fraser River Pack *	Canadian Traps in Juan de Fuca Straits	Puget Sound Pack	Total Cases
1925.....	31,523	3,862	106,064	141,449
1926.....	83,589	2,091	44,569	130,249
1927.....	57,085	4,337	96,343	157,765
1928.....	26,530	2,769	61,044	90,343
1929.....	60,407	3,480	111,856	175,743
1930.....	93,416	5,334	352,194	450,944
1931.....	38,507	2,440	83,728	124,675
1932.....	61,769	4,000	78,319	144,088
1933.....	43,745	8,721	125,738	178,204
1934.....	133,159	6,117	352,579	491,855
1935.....	57,212	5,610	54,677	117,499
1936.....	164,408	3,837	59,505	227,750
1937.....	66,583	6,152	60,259	132,994
1938.....	169,430	3,784	139,173	312,387

* For the years 1925 to 1929 inclusive, figures represent sockeye pack at Fraser River canneries, regardless where caught. From 1930 onwards, figures represent pack of Fraser River sockeye, regardless where canned.

STATEMENT No. 16

STATEMENT OF FISHERY LICENCES ISSUED, BRITISH COLUMBIA--WHOLE PROVINCE, 1933

Variety of Licence	Issued				Transfers				Operating				Total		
	White	Ind.	Others	Jap R.S.	Can- celled	Total	White	Ind.	Jap R.S.	Total	White	Ind.		Others	Jap R.S.	Can- celled
Salmon trap-net.....	5	9				5					5	9			5
Salmon drag-seine.....	238	62			1	301					238	62			301
Salmon purse-seine.....	3,285	1,492	910	44	78	5,809	977	322	17	1,316	4,262	1,814	910	61	78
Salmon gill-net.....	2,742	475	155	2	11	3,385	68			68	2,810	475	155	2	11
Salmon trolling.....	49	141	314	1	43	548					49	141	314	1	43
Asst. Salmon gill-net.....	81	96				177					81	96			177
Capt. salmon seine.....	1,041	721			1	1,763					1,041	721			1,763
Asst. salmon seine.....	245	22	151	2	15	435					245	22	151	2	15
Cod.....	89	15	1	1	1	107					89	15	1	1	107
Crab.....	169	20	297	2		488					169	20	297	2	488
Grayfish.....	50	2	33	5	3	93					50	2	33	5	93
Miscellaneous fishery.....	34		18		2	54					34		18		54
Smelt.....	33		10			43					33		10		43
Small dragger.....	7					7					7				7
Herring pound permits.....	40	2	2			44					40	2	2		44
Herring purse-seine.....	22		4			26					22		4		26
Herring gill-net.....	21	2	5			28					21		5		28
Capt. herring seine.....	251	72	76			399					251	72	76		399
Asst. herring seine.....	29					29					29				29
Pilchard purse-seine.....	20	3				23					20	3			23
Capt. pilchard seine.....	167	10				177					167	10			177
Asst. pilchard seine.....															
Capt. halibut boat for bait.....	10					10					10				10
Totals.....	8,628	3,144	1,976	57	155	13,960	1,045	322	17	1,384	9,673	3,466	1,976	74	155
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LICENCES ISSUED BY PROVINCIAL FISHERIES DEPARTMENT

Angling Permits.....	37 (2 cancelled)	Salmon Cannery.....	38	Herring Cannery.....	2
Anglers Day Permits.....	56	Salmon Dry Saltery.....	7	Herring Dry Saltery.....	3
Indian Permits.....	1,694 (1 cancelled)	Tierced Salmon Plants.....	6	Herring Reduction.....	12
		Cold Storage Plants.....	8	Pilchard Cannery.....	3
		Miscellaneous Plants.....	14	Pilchard Reduction.....	7
		Whale Reduction.....	2		
		Commercial Fishery Licenses for non-tidal waters.....	139		

STATEMENT No. 17

STATEMENT OF NUMBERS OF DIFFERENT SPECIES OF SALMON AND METHOD OF CAPTURE, REPORTED BY OPERATORS OF SALMON PURSE-SEINES, DRAG-SEINES, AND TRAP-NETS, AND BY SALMON CANNING, CURING, AND COLD STORAGE ESTABLISHMENTS, OF GILL-NET AND TROLL CAUGHT FISH, BRITISH COLUMBIA—1938

—	Sockeye	Springs	Blue-back	Steel-head	Coho	Pink	Chum	Total
Troll.....	1,182	144,978	412,663	89	950,813	16,188	815	1,526,728
Gill-net.....	4,443,814	162,506	1,174	82,876	825,432	2,745,707	1,072,985	9,334,494
Purse-seine.....	522,542	10,525	366	1,580	328,666	4,152,990	3,576,914	8,593,583
Drag-seine.....	59,617				19,477	74,405	12,811	166,310
Trap-net.....	41,372	12,677		873	25,223	1,472	953	82,570
Totals.....	5,068,527	330,686	414,203	85,418	2,149,611	6,990,762	4,664,478	19,703,685

STATEMENT No. 18

STATEMENT OF NUMBER OF SALMON CAUGHT BY PURSE-SEINES, SHOWN BY SEINING AREAS, SEASON 1938

Area	Sockeye	Spring	Blue-back	Steel-head	Coho	Pink	Chum	Total
1.....	1,397	10			1,861	283,405	6,575	293,248
2.....	123	6		10	23,261	975,408	482,500	1,486,308
3.....	6,543	132		68	7,707	455,079	71,664	541,193
4.....						16,787	1,500	18,287
5.....	44,922	18		2	52,799	499,247	39,806	636,794
6.....	47,179	301		111	52,841	736,977	194,665	1,032,074
7.....	30,163	357		100	31,678	315,322	474,497	852,117
8.....	166	91		43	4,407	41,054	32,568	78,329
9.....					99	9,521	2,053	11,673
10.....	195				1,036	704	28,941	30,876
11.....		1			4,522	612	5,192	10,327
12.....	92,866	4,567	93	999	48,613	643,507	389,992	1,180,637
13.....	17,131	1,245	273	173	16,691	136,017	417,127	588,657
14.....		1		3	5,482		227,262	232,748
15.....					137		27,239	27,376
16.....	1,653				1,937	159	135,931	139,680
17.....								
18.....	228,148	3,469		63	6,064	879	18,226	256,849
19.....								
20.....								
21.....	2,358	144			13,289	11	48,977	64,779
22.....					6,204	16	103,896	110,116
23.....	4,786	120		6	13,566		426,130	444,608
24.....	44,909	61			10,352	1,396	95,189	151,907
25.....					3,490		207,014	210,504
26.....					2,098		38,018	40,116
27.....	3	2		2	15,532	36,889	101,952	154,380
Totals.....	522,542	10,525	366	1,580	328,666	4,152,990	3,576,914	8,593,583

STATEMENT No. 19

STATEMENT SHOWING PACKS OF CANNED SALMON, 1932-1938, WITH QUANTITIES GRADED SECOND QUALITY AND PERCENTAGES

	Sockeye	Springs	Steel-head	Blue-back	Coho	Pinks	Chum	Total
1932 Pack, cases.....	284,355	76,060	1,168	28,505	160,466	223,716	306,761	1,081,031
Grade B, cases.....	3,355	1,234	164	333	333	119	3,083	8,288
Per cent.....	1.179	1.622	.575	.207	.053	1.005	.766	
1933 Pack, cases.....	258,107	20,266	1,459	21,763	137,289	532,558	293,630	1,265,072
Grade B, cases.....	494	.....	.....	10	873	15,149	887	17,413
Per cent.....	.191	.....	.....	.045	.635	2.844	.302	1.376
1934 Pack, cases.....	377,882	29,734	1,282	29,556	195,874	435,364	513,184	1,582,926
Grade B, cases.....	21,620	139	5	.....	962	4,085	1,127	27,938
Per cent.....	5.721	.466	.390	.....	.491	.938	.219	1.764
1935 Pack, cases.....	350,444	21,920	596	15,319	216,173	514,966	409,604	1,529,022
Grade B, cases.....	3,435	659	.....	.....	3,840	20,528	5,601	34,063
Per cent.....	.980	3.006	.....	.....	1.776	3.986	1.367	2.227
1936 Pack, cases.....	415,024	29,854	1,068	33,718	212,343	591,532	597,487	1,881,026
Grade B, cases.....	13,725	.....	.....	.....	483	29	5,265	19,502
Per cent.....	3.307	.....	.....	.....	.227	.005	.881	1.036
1937 Pack, cases.....	325,774	16,171	844	19,236	113,972	585,576	447,602	1,509,175
Grade B, cases.....	65	.....	.....	.....	68	27,282	3,212	30,627
Per cent.....	.019	.....	.....	.....	.059	4.659	.717	2.029
1938 Pack, cases.....	447,453	15,531	1,035	27,417	273,906	400,876	541,812	1,707,830
Grade B, cases.....	15,446	.....	.....	56½	666	1,413	1,250	18,831½
Per cent.....	3.451	.....	.....	.206	.243	.352	.230	1.102

GENERAL SPAWNING REPORT—1938

This year's migration to the salmon spawning grounds continues to justify the expectation that under present conservation measures, properly enforced, the supply of salmon in this province should always be maintained.

Conditions vary from year to year in the way of intensive fishing, freshets, obstructions in streams, fishermen's strikes, weather conditions, etc., each having its effect on escapement, but each situation is being promptly met by any necessary measures.

During the season under review, while there was the usual toll of spawning fish by numerous enemies, such as trout, and ducks, eagles, and other bird life, there was also a large toll taken by bears and wolves. Conditions in this respect are particularly difficult in the short shallow streams in the Queen Charlotte Islands, where the bears are undoubtedly on the increase, resulting in some spawning streams being entirely denuded of spawning fish. During the past fall the situation has been aggravated by the depredations of wolves which are reported as being greatly on the increase. It is suggested that the usual food of the wolves is not so plentiful as heretofore and that they are now dependent more on salmon. It is a fact that during the past fall the inspecting officers have found many cases where wolves have destroyed large quantities of spawning salmon. This does not, however, apply to the Queen Charlotte Islands district, where there are no wolves.

The outstanding feature in the salmon runs of this season was the unusually large run of big cohoes. These large quantities were found practically all along the coast, although the trollers found difficulty in taking as large a percentage of the run as might have been expected. For some reason or other, possibly due to the presence of more desirable food, the cohoes did not take the fishermen's lure as readily as in other seasons.

A detailed report covering the several areas follows:—

Queen Charlotte Islands.—There was the usual small supply of sockeye in the Massett Inlet and Copper River area, but the run is so small as to be unimportant commercially. A average seeding occurred. The coho seeding was a satisfactory one.

In the case of pinks the supply on the spawning grounds was found to be adequate, generally speaking, with exceptionally heavy supplies on some of the spawning grounds along the southeast shores of the islands.

The supply on the Yakoun was good, notwithstanding that the catch was light. This also applies to the streams of Naden harbour. In the other streams in the Massett Inlet area, however, the supply was found to be light.

In the case of chums, a good seeding was observed in the Cumshewa district, but in other areas the spawning was only fair. By means of extra protective measures a fair percentage of the run was permitted to escape to the spawning grounds.

Naas Area.—The usual inspection was made of the Meziaden portion of the watershed, to which the largest proportion of the sockeye salmon to the Naas proceeds.

It was found that the seeding by the early run of sockeye was heavy, being very similar to that of the preceding year, better than that of 1933, but not quite as large as the heavy run in 1934. The later run was also heavy, being better than the late run reported in 1933, but similar to the good seeding of 1934, and much heavier than that of 1937. Generally speaking, the seeding of this area was heavy.

There was an unusually large run of coho salmon but the inspection in the Meziaden district was too early to observe just what the actual spawning had been on that portion of the watershed. However, the local inspector reports "a very unusual run of cohoes in the Naas area this season, nobody living here having seen anything like it."

There is no doubt that the spawning grounds, which are mostly inaccessible from the standpoint of inspection, are well supplied. The individual fish were also reported to be unusually large. There was a satisfactory supply of pinks found on the spawning grounds although not quite as heavy as the seeding of 1936, the brood year. The run was late, which accounts for the seines not taking larger quantities. The spawning of chums was also very good throughout the area.

At Meziaden lake the fishway was found to be functioning quite satisfactorily and the salmon had no difficulty in passing through.

The spring salmon seeding was not quite up to expectations.

Skeena Area.—The measures taken in recent years at this stream in the way of conservation by means of moving the boundary nearer to the mouth of the river, and the shortening of the fishing season, coupled with a voluntary reduction in the number of fishing boats operated by the canners, would appear to be bringing the desired results in the way of adequate spawning.

The sockeye escapements to the most important areas, such as Babine and Lakelse, have been gratifying during the season under review.

On the upper Babine river the conditions were found to be fairly satisfactory, although on the lower river they were not quite so good. Taking these two areas together the spawning was found to be equal to that of 1934.

Fulton river, Pierre creek, Fifteen Mile creek, and Morrison creek, which are the principal sockeye spawning areas in Babine Lake district, were fairly heavily supplied with sockeye, and spawning conditions generally were found to be good.

In the case of cohoes, generally speaking the seeding was quite satisfactory. This also applies to the spring variety.

The inspecting officer sums up as follows: "Babine spawning beds, in comparison with other years, have been adequately seeded by a medium to heavy run of sockeye, a heavy run of springs, a heavy run of cohoes, and a heavy run of pinks. The only exception to this would be Pierre creek and Lower Babine river in regard to sockeye."

At the Morris Lake watershed a reasonably good inspection was made this fall and apparently at the proper time. A medium heavy run of sockeye was observed on the spawning grounds, with quite a heavy run of springs, the latter being large individually.

In the Lakelse Lake area, the principal spawning grounds for sockeye are Williams, Schullabuchan and Granite creeks. The supply found this year was excellent and better than that of the brood year of 1934. There was a fair seeding of springs and a satisfactory supply of pink salmon.

Lowe Inlet Area.—The seeding of sockeye is reported at most of the streams in this subdistrict as heavy, and a considerable increase over the cycle year. There was an unexpected increase in the supply of cohoes found and the seeding is considered ample.

In the case of pinks the southern portion of the area was rather poorly seeded but a comparatively good escapement occurred, due to early closing of fishing. In the northern portion of the area, however, the pink run was quite heavy to all streams. Good supplies of chums were found in most of the spawning beds in the district, with a few exceptions. On the whole, however, the seeding might have been better.

Butedale Area.—The weather was unusually dry this fall which made conditions in many of the small streams difficult, and required extra precautions in the way of prohibition of fishing to assure of sufficient supplies being made available to the spawning grounds.

The sockeye supply, however, is reported as larger than usual, with the escapement showing an increase over that of 1934. The escapement of cohoes was much heavier than the average of recent years.

The springs are never a big factor in the spawning of the Butedale area, but the supply was hardly up to normal.

In the case of pinks the seeding was reasonably satisfactory and it is expected that it may result in a satisfactory return two years hence.

The supply of chums was found to be entirely satisfactory.

Bella Bella Area.—The sockeye seeding in this area was found to be satisfactory, largely due to the measures taken for the purpose of conservation. There was a heavy escapement of cohoes, the fish being individually large. This was an "off" year for the pink variety, but despite this fact the seeding was found to be quite heavy.

An abundance of chum salmon was found on the spawning grounds, in fact both early and late runs were very numerous.

Bella Coola Area.—This year's spawning took place under generally favourable conditions. Up to date of inspection no freshets had occurred and the prospects for reasonably satisfactory results were good. Encouraging supplies of sockeye were found, being equal to the seeding of the brood year. Cohoes, springs and chums were also well represented on the spawning grounds and showed an increase in comparison with recent years. The pinks, on the contrary, were scarce, the seeding being much below that of the brood year of 1936.

Rivers Inlet Area.—The sockeye seeding is reported as being better than usual and the writer is of the opinion that under present regulations, properly enforced, there would appear to be no reason why these conditions should not always obtain.

Rivers inlet is not considered a good fall salmon area although the coho supply was found to be somewhat better than usual, the run of pinks rather poor. This also applies to the chums.

Smiths Inlet Area.—This area is also primarily a sockeye district and the escapement in the year under review is reported as being most encouraging. With the present regulations at this point well enforced there would appear to be no reason why the supply should not also always be maintained.

The run of cohoes was somewhat better than average, and the escapement of chums was quite good to the small portion of the area utilized by this variety.

FRASER RIVER WATERSHED

Prince George Area.—The escapement of sockeye, though not large, was a little better than the average of recent years. This applies particularly to the streams tributary to Stuart lake.

In the Francois Lake system the returns this year were encouraging, compared with those of recent seasons.

The number of spring salmon appearing on the spawning grounds was fairly heavy, comparatively.

Quesnel Area.—A few sockeye only were observed in the Bowron Lake system, and none at all in the Horsefly or Mitchell rivers, tributary to Quesnel lake.

In the Chilcotin system, however, the escapement showed an increase of 100 per cent over that of the brood year of 1934. This, no doubt, was partly the result of the arrangements made whereby Indians were not permitted to take any sockeye whatever on their way to the Chilco Lake spawning grounds.

Kamloops Area.—It will be remembered that this cycle has been increasing during recent years and in 1934 there was a most satisfactory seeding of the sockeye spawning grounds of the Shuswap district. This year there was again a large increase, in fact the return was surprisingly large, notwithstanding the excellent seeding of 1934. The numbers were estimated at four or five times as great as in the brood year.

Adams and Little rivers are the chief spawning areas and the gravel beds of these streams were literally covered with spawning sockeye. In the Adams river particularly, in addition to the distribution along the entire bed, there were large masses along both banks of the stream and many deep holes were practically full of spawning sockeye.

Although the fishways at the outlet of Adams lake leave something to be desired, yet that on the left hand side functioned reasonably well, resulting in a considerable escapement to the lake. A resident at the dam informed the writer that she had counted as many as 700 sockeye per hour passing through this fishway at times.

At the mouth of Adams river, at the time of inspection, there were large quantities of sockeye milling about in the lake, waiting to go up stream. At Scotch creek, which had received practically no sockeye for some seasons past, there was observed a mass of sockeye which later reached the spawning beds. This river has had the best seeding for a good many years.

The physical condition of the salmon was excellent. The fish were, with few exceptions, unscarred and vigorous, which seemed to show that the conditions at Hell's Gate had presented no difficulties.

In the north branch of the Thompson river a normal run of sockeye was observed at Raft river, but none at Barriere river. Spring and coho salmon, however, were observed in fair numbers.

Pemberton Area.—It will be remembered that for many years previous to 1936 very few sockeye were observed in the Anderson-Seton Lake system. In 1936, however, there was an encouraging return and in 1937 quite a large run appeared. This year, however, there was only a matter of a few hundred observed and these were mostly in Gates creek at the head of the system.

In the Birkenhead river the run of sockeye was quite good, the run being at least equal to that of the brood year. A heavy run of cohoes also reached this watershed.

The coho run to the Squamish river and tributaries was the heaviest in years and the spawning beds were well seeded. The supply of chums was also found to be very satisfactory. This also applies to the spring variety.

Hope Area.—The sockeye spawning grounds in this area are limited but a good run was observed to pass freely through Hell's Gate, the water conditions at that point being quite suitable practically all season. There was no congestion of salmon observed at the gate as is often the case. Only a few sockeye appeared in Kawkawa lake.

The coho supply on the spawning grounds is reported as being heavier than that of any recent year and the chum salmon spawning was also quite satisfactory.

Chilliwack Area.—Only a moderate number of sockeye reached the spawning grounds of Chilliwack lake and its tributaries. The run to Cultus lake, by actual count, was in the vicinity of 6,000. The coho spawning was the heaviest in years and the chum supply was also satisfactory.

The spring salmon run was normal.

Harrison Lake Area.—The sockeye spawning is considered satisfactory, compared with that of recent years. Quite a good seeding was observed at Morris creek, which is the principal spawning ground of the area. Springs appeared in satisfactory quantities in the usual spawning grounds of the main channel of Harrison river. Cohoes and chums were found to be numerous also on the spawning grounds.

Pitt River Area.—The spawning conditions of sockeye in this area were found to be normal. This also applies to springs. A heavy run of cohoes appeared in the tributaries of the Upper Pitt river.

Lower Fraser Area.—In the Serpentine and Nicomekl rivers there was found the largest supply of coho salmon seen in several years and this applies to other streams in the lower part of the Fraser River system.

In the case of chums the seeding was not so satisfactory, apart from the Cultus Lake area. During the fishing season additional closed time was arranged to permit a larger portion of the run to escape the nets. It is expected that the resultant spawning will prove reasonably satisfactory.

North Vancouver Area.—There was a heavy seeding of cohoes and chums in the streams tributary to Burrard inlet. It was an "off" year for pink salmon but a few were observed in Indian river.

Alert Bay Area.—The sockeye spawning was unusually good, due no doubt largely to a strike of fishermen which resulted in fishing operations not commencing until June 26, practically a month later than usual.

The whole Nimpkish area was splendidly supplied with spawning sockeye. Normal supplies were also observed in McKenzie sound, Glendale cove, and Thompson Sound spawning grounds.

The supply of springs was, generally speaking, normal, with heavy runs to the Nimpkish and Adams rivers.

The run of pink salmon to Knight Inlet streams was also reported as heavy, particularly at Glendale cove. The spawning grounds of Wakeman river, Thompson sound, Bond sound, and other mainland streams were disappointing, and the supply to Adams river, Keough and Klucksevi rivers was not equal to the brood year of 1936.

The coho supply was, generally speaking, very satisfactory. The mainland streams were well seeded but the streams on Vancouver Island were not so well supplied, with the exception of Quatsi river, where there was a heavy run. The size of the individuals is also commented upon by the inspecting officer.

Practically all the rivers in the area were well supplied with chums. This includes Seymour inlet where some doubt had been expressed as to the escapement.

Quathiaski Area.—The sockeye seeding at Hayden bay was found to be a considerable increase over that of the brood year, and in fact this is the fourth year in succession in which increases have been observed. The Phillips Arm run compared favourably with that of four years previously.

The escapement of springs to the streams used by this variety, and particularly to Phillips and Campbell rivers, is reported as being very satisfactory. The number of cohoes on the spawning beds was greater than for many years. The inspecting officer remarks also on the large size of the individual fish of this variety.

The pink run, while late, was found to be present in numbers comparing favourably with the brood year of two years previously. The chum escapement was better than for several seasons.

Comox Area.—The pink seeding at Oyster river is reported as very satisfactory, being an improvement of 100 per cent over the brood year of 1936. The other pink streams, however, showed a disappointing seeding, particularly at Puntledge river. The brood year also was poor and was no doubt the result of the disastrous flood in 1934.

The coho seeding is reported generally as extremely satisfactory, exceeding anything anticipated. The only exception was the Puntledge river where the return is reported as being below normal. In the Tsoleum river, a tributary of the Puntledge, however, a good supply was observed.

A good run of chums was observed on the spawning grounds, the Little Qualicum river showing the heaviest return of any stream in the district. The closure of fishing in the waters adjacent to the Comox peninsula permitted a good supply of chums to reach the spawning areas of Puntledge river. A satisfactory supply also reached the spawning grounds of Oyster river. The spring salmon spawning in Puntledge river compared favourably with that of 1937. The spawning of steelhead, particularly in Puntledge, Tsoleum and Oyster rivers, is reported as good, but the Big Qualicum supply was not quite so satisfactory.

Pender Harbour Area.—Saginaw lake is the only sockeye spawning ground of any importance in the area and it was found that the sockeye spawning was better than in recent years. The supplies of springs to the spawning grounds in the Pender Harbour area were normal.

A good supply of cohoes was observed.

In the case of chums, notwithstanding the heavy catches made by the fishermen, the escapement to the streams at the head of Jervis inlet was exceptionally heavy. This being an "off" year for pinks, only a light seeding occurred.

Nanaimo Area.—This is not a sockeye area. The springs, however, were found in much larger numbers on the spawning beds than in the previous year, although the run then was considered good.

The coho supply was heavier than in recent years, the escapement to the Nanaimo River watershed being greater than observed for many years, and in the Chemainus watershed the number was greater than usual. The fish in this area also were observed to be unusually large individually.

Pinks do not frequent the Nanaimo area in any material numbers. The spawning areas, however, were well supplied with chums.

Ladysmith Area.—The information given under the Nanaimo heading applies also to the Ladysmith area.

Cowichan Area.—The supply of spring salmon on the spawning grounds was lighter than that of the corresponding cycle, and due to the unusually low

water special precautions were necessary to see that a reasonable quantity escaped the commercial fishermen and the fishing by Indians for their own food purposes.

There was a good supply of cohoes on the spawning grounds and a heavy seeding of chums.

Victoria Area.—An increase in the number of spawning cohoes was observed, compared with other years, and the size of the individuals was greater. An average spawning of chums occurred.

The inspecting officer reports American merganser ducks as particularly numerous on the spawning beds. Over seventy of these birds were shot. Some of the stomachs are reported as being gorged with salmon eggs and all of those examined contained some eggs.

Alberni Area.—The sockeye supply to Hobarton lake is reported as disappointing. An average number of spawners was found in the Anderson lake system, and in the Sproat Lake-Great Central Lake areas the seeding was found to be very good, the run being estimated to exceed that of the brood year.

Some changes were made at the fishway at Stamp falls which made the passage of salmon much easier. There was no difficulty experienced at Sproat Falls.

There was a heavy spawning of cohoes in practically all the rivers of any importance in the area, an exceptionally heavy spawning occurring in the creeks of the Somass River system.

The seeding of the spawning grounds by spring salmon was reported generally as being good.

The supply of chums was found to be very heavy, notwithstanding the lower average catches by the commercial fishermen.

Clayoquot Area.—A good spawning of sockeye occurred in Megin river, but the run to the main spawning grounds of this species, that is, Kennedy lake, is reported to have exceeded expectations and was far heavier than that of the brood year.

The coho supply was found to be the largest for twenty years, all the streams being heavily seeded.

The supply of chum spawners was good.

Nootka Area.—This is not an important sockeye area but the escapement was normal, with the exception of Burnam river where there was a slight decrease in numbers. The spawning of spring salmon was much the same as usual. The coho supply was an average one.

The chief run of salmon is the chum variety and, although the runs were not as great as hoped for, the seeding of the spawning grounds is reported to be satisfactory.

Kyuquot Area.—A very good run of springs was found on the spawning grounds and an exceptionally good supply of cohoes, the individual fish being also greater in size than usual. There was also a good supply of chums observed.

Quatsino Area.—This is not an important sockeye area but there was a heavy run of springs to Marble creek, which contains seventy-five per cent of the spring spawning area district.

The coho supply was above the average and the size of the individual fish larger than usual.

The pink supply in the Rupert Arm area is reported as being very heavy. This is the most important pink area of the district. The supplies to the other spawning grounds were light.

The chum supply was quite satisfactory, the escapement being above average.

APPENDIX No. 2

FISH CULTURE

ANNUAL REPORT J. A. RODD, DIRECTOR

Fish cultural operations of the Department of Fisheries were confined to those provinces in which it administered the fisheries, namely, Nova Scotia, New Brunswick and Prince Edward Island. In addition over 1,000,000 sockeye salmon eyed eggs were planted in Hillier creek, tributary to Maggie lake, Vancouver Island, in continuation of the stocking effort, resumed in 1937, to add these waters to the sockeye reproducing areas of the Barkley Sound district.

The transfer of the game fish hatcheries, previously operated by this department, to the Province of British Columbia, under the authority of the Order in Council (P.C. 2532) of October 12, 1937, is reflected in the distribution statements embodied in this report, which show a considerable decrease as compared with distributions for 1937. In 1938, however, 95 per cent of the output was reared to various stages of development beyond the fry stage in comparison with 53 per cent in 1937.

The total output from the hatcheries operated by this department in 1938 was 33,685,297. The numbers of each species distributed were:—

STATEMENT BY SPECIES OF THE FISH AND FISH EGGS DISTRIBUTED FROM THE HATCHERIES DURING THE YEAR ENDED DECEMBER 31, 1938

Species	Eyed Eggs	Fry	Advanced Fry	Finger-lings	Year-lings and Older	Total Dis-tribution
<i>Salmo salar</i> -Atlantic salmon.....		280,000	5,453,400	15,853,103	53,807	21,640,310
<i>Salmo salar</i> ouananiche-Ouananiche salmon.....					1,612	1,612
<i>Salmo salar</i> sebago-Sebago salmon.....				42,239	26,320	68,559
<i>Salmo irideus</i> -Rainbow trout.....				158,133	7,235	165,368
<i>Salmo fario</i> -Hybrid brown trout..... (Brown trout-Atlantic salmon).....					1,885	1,885
<i>Oncorhynchus nerka</i> -Sockeye salmon.....	1,033,359					1,033,359
<i>Salvelinus fontinalis</i> -Speckled trout.....		309,000	684,000	9,449,134	37,495	10,479,629
<i>Cristivomer namaycush</i> -Salmon trout.....			120,000	174,575		294,575
Totals.....	1,033,359	589,000	6,257,400	25,677,184	128,354	33,685,297

The following classification of green eggs, eyed eggs, fry, advanced fry, No. 1 fingerlings, etc., applies to all statements and references in this report:—

Green Eggs.—Eggs until they are "eyed."

Eyed Eggs.—Eggs showing the eyes of the developing fish.

Fry.—Fish from date of hatch until free-swimming with the food sac fully absorbed. (No fry are distributed until the sac is fully absorbed.)

Advanced Fry.—Fry that are feeding systematically.

No. 1 Fingerlings.—Fish that are feeding from two to eight weeks.

No. 2 Fingerlings.—Fish that are feeding from eight to fourteen weeks.

No. 3 Fingerlings.—Fish that are feeding from fourteen to twenty weeks.

No. 4 Fingerlings.—Fish that are feeding from twenty to twenty-six weeks.

No. 5 Fingerlings.—Fish that are feeding from twenty-six weeks to one year from date of hatch.

Inspections were continued with a view to locating waters where fish eggs might be obtained in sufficient quantities to warrant the establishing of collecting camps and also with a view to locating sites where the fish cultural service might be extended advantageously to districts that are not readily accessible from existing hatcheries.

Experiments with equipment, methods and foods of various kinds were continued at several hatcheries. The experiments and the investigations in relation to fish cultural problems that were made by the Fisheries Research Board of Canada are referred to in the board's report for 1938.

Thirteen main hatcheries, one subsidiary hatchery, six rearing stations, eight salmon-retaining ponds and several egg-collecting stations were operated in 1938. The output from these establishments was as follows:—

THE FOLLOWING TABLE SHOWS THE HATCHERIES OPERATED, THEIR LOCATION, DATE OF ESTABLISHMENT, THE SPECIES AND THE NUMBER OF EACH SPECIES DISTRIBUTED FROM EACH HATCHERY DURING 1938

Estab- lished	Hatchery	Location	Species	Eyed eggs	Fry	Advanced fry	Fingerlings					Year- lings and older	Total distrib- ution by species	Total distrib- ution by hatcheries
							No. 1	No. 2	No. 3	No. 4	No. 5			
1929	Antigonish	St. Andrews, N.S.	Atlantic salmon. Rainbow trout.			450,000	980,000	69,304 24,664				971 3,518	1,499,304 25,665	1,499,304
1876	Bedford	Bedford, N.S.	Speckled trout. Atlantic salmon.			45,000	1,576,000	167,106	9,000	2,000			1,757,624	3,282,593
1937.	Cobequid	Jackson, N.S.	Speckled trout. Atlantic salmon.		180,000	820,000	333,000 848,600						780,125 1,331,725	
1938	Coldbrook (f).	Coldbrook, N.S.	Speckled trout.				590,000	130,168	21,783				1,848,600	2,590,551
1936	Grand Lake (f).	Wellington Station, N.S.	Atlantic salmon.				20,000	33,000	478,624	108,000		28,807	108,000	507,431
1937	Kejimikwik (f)	New Grafton, N.S.	Atlantic salmon. Speckled trout.				42,000		3,000	66,628			95,000	164,628
1912	Lindlof	St. Peters, N.S.	Atlantic salmon. Rainbow trout.				419,206 22,249						419,206	
1902	Margaree	N.E. Margaree, N.S.	Speckled trout. Atlantic salmon.			1,360,000	945,000	151,000	33,486	68,650			154,486	625,941
1935	Mersey river, No. 3 Develop- ment (f).		Speckled trout.				1,206,585	285,000	259,000	230,000	155,190	4,706	2,827,650	4,978,131
1913	Middleton	Liverpool, N.S. Middleton, Annapolis Co., N.S.	Atlantic salmon. Atlantic trout.			120,000	50,000	425,000	64,600				483,350	64,600
1933	Nictaux Falls (d.).	Nictaux Falls, N.S.	Speckled trout.			80,000	174,575	292,000	274,275				294,575	1,490,300
1929	Yarmouth	South Ohio, N.S.	Atlantic salmon. Rainbow trout.		100,000	225,000	275,000 130,000	145,000 56,000	201,400	200	10,000	25,000	701,400	701,400
1928	Florenceville	Florenceville, N.B.	Speckled trout.		250,000	118,000	315,000		78,950	32,000	43,300	18,437	689,000	1,533,387
1880	Grand Falls	Grand Falls, N.B.	Speckled trout.			20,000	428,000		384,211			6,251	850,087	2,077,912
1874	Miramichi	South Esk., N.B.	Atlantic salmon.		20,000	85,000	576,500	17,000	950				620,701	3,683,889
1874	Restigouche	Flatlands, N.B.	Speckled trout.			2,067,000	1,137,000	825,000	408,403				2,443,403	3,683,889
1914	Saint John	Saint John, N.B.	Atlantic salmon. Speckled trout.		4,000	275,000	30,000	715,000	388,486			41	3,513,950	3,937,957
			Brown trout hybrids.				66,000	548,350	2,566				2,531,536	2,606,257
			Ouaniche				2,501,668	29,788					8,811	925,624
			Atlantic salmon.				647,112		1,512			1,885	1,885	
1938	Cardigan (f.)	Cardigan, P.E.I.	Rainbow trout. Seago salmon. Speckled trout. Rainbow trout. Speckled trout.		35,000	195,000	471,500	3,500 12,000	42,239	8,750 42,490		1,612 26,320 4,512	1,264 68,550 718,262	1,264 68,550 718,262
									209,500	160,770			370,270	462,760

1906 Kelly's Pond.....	Southport, P. E. I.....	Atlantic salmon.....	58,400	526,600	.....	.....	.....	583,000
1911 Anderson lake (a)	Anderson lake, Kildonan, Vancouver Island, B.C.	Speckled trout.....	28,000	155,624	.....	24,316	.....	207,940
		Sockeye salmon (e)	1,033,359	.....	.....	.....	.....	1,033,359
			1,033,359	589,000	6,257,400	16,370,890	5,072,165	33,655,297

(a) Subsidiary hatchery.

(d) Pond and rearing station combined.

(e) Autumn collection, 1933.

The eggs, fry and fingerlings included in this distribution, with the exceptions indicated, were from collections in the autumn of 1937 and the spring of 1938.

HATCHERY OUTPUT, BY PROVINCES, OF EYED EGGS, FRY, FINGERLINGS, YEARLINGS AND OLDER FISH DURING 1938

	Eyed eggs	Fry	Advanced fry	Fingerlings					Yearlings and Older	Total distrib- ution by species	Total distrib- ution by province
				No. 1	No. 2	No. 3	No. 4	No. 5			
<i>New Scotia</i> —											
Atlantic salmon.....			2,980,000	3,983,725	1,396,510	994,174	187,450	10,000	53,807	9,885,666	
Rainbow trout.....	280,000		120,000	174,575	46,943	200	18,500	.....	5,971	71,614	
Salmon trout.....	250,000		316,000	4,188,185	1,035,274	674,494	438,628	198,490	26,661	294,575	
Speckled trout.....										7,127,732	
	530,000		3,416,000	8,346,485	2,478,727	1,668,868	644,578	208,490	86,439	17,379,587	17,379,587
<i>New Brunswick</i> —											
Atlantic salmon.....			2,417,000	6,129,380	1,831,138	794,126	.....	.....	.....	11,171,644	
Brown trout hybrids.....							.....	.....	.....	1,885	
Ouaniche salmon.....							.....	.....	.....	1,612	
Rainbow trout.....							.....	.....	.....	1,612	
Sebago salmon.....							.....	.....	.....	26,320	
Speckled trout.....	59,000		340,000	1,212,801	750,300	392,002	8,750	.....	10,834	2,773,687	
	59,000		2,757,000	7,342,181	2,581,438	1,228,367	8,750	.....	41,915	14,018,651	14,018,651
<i>Prince Edward Island</i> —											
Atlantic salmon.....			56,400	526,600	.....	.....	.....	.....	.....	552,000	
Rainbow trout.....			23,000	155,624	12,000	38,000	42,490	.....	.....	92,400	
Speckled trout.....						233,816	160,770	.....	.....	578,210	
			84,400	682,224	12,000	271,816	203,260	.....	.....	1,253,700	1,253,700
<i>British Columbia</i> —											
Sockeye salmon.....	1,033,359								.....	1,033,359	1,033,359
									.....	33,655,297	33,655,297

Six thousand, three hundred and fifty-eight Atlantic salmon were obtained for fish cultural purposes and retained at the various ponds operated by this department in the Maritime provinces. Of these 4,210 were purchased from commercial fishermen and 2,148 were taken in the departmental traps. The following is the average weight in pounds of salmon secured in 1938 from various sources: In Nova Scotia: Margaree harbour, Inverness county, 10.6; Nictaux river, Annapolis county, 6.4; River Philip, Cumberland county, 12; Sackville river, Halifax county, 12. In New Brunswick: Miramichi river, Northumberland county, 8.3; New Mills, Restigouche county, 14; St. John harbour, St. John county, 11. And in Prince Edward Island, Morell river, Kings county, 8. The average weight of the Sackville River salmon was more than double the average weight of those impounded in 1937 and 27,753,500 Atlantic salmon eggs were collected from all ponds.

The production of speckled trout eggs at the Maritime Province hatcheries reached a new high this year with over 17,124,000 ova secured—an increase of more than 1,320,000 over last year. This increase is largely due to expansion of rearing facilities and of accommodation for brood fish. Noticeable increases over the previous year were made from the Antigonish, Florenceville and St. John hatchery ponds. The possibilities of McRae lake in the Lindloff Hatchery district were prospected and 126,000 eggs secured.

Five hundred thousand salmon trout eyed eggs were obtained from the Department of Game and Fisheries for Ontario for an equal number of speckled trout eyed eggs.

Anderson Lake hatchery, Vancouver Island, was opened up in October to continue the stocking of Maggie lake with sockeye salmon and over 1,000,000 eyed eggs were planted under favourable conditions on December 10 and 11, 1938.

In continuation of the experiment in regard to the influence of environment versus heredity on Atlantic salmon referred to in previous reports, some 189,000 fingerlings, the progeny of "early" fish taken at New Mills, Chaleur bay, were distributed in the St. John river and its tributaries from the Grand Falls hatchery.

Over 566,000 Atlantic salmon fingerlings including some 69,000 yearlings and some two-year fish have been distributed to date in waters of the Maritime provinces having two fins missing, viz., the adipose and one pectoral or one ventral. A fair proportion of the New Mills stock distributed in the St. John river are included in this number.

The recapture of these marked salmon will add to present data in regard to the "homing" theory, sea movements or migrations and the influence of heredity versus environment in relation to the Atlantic salmon of Canadian streams. One dollar will be paid for scales and scars left by the removal of the fins from each recaptured marked salmon together with particulars as to its length, weight, date and place of recapture.

The closed circulatory system was again tested at Restigouche hatchery, 110,000 Atlantic salmon semi-eyed eggs being placed in the experimental troughs on December 12, 1937. The previous season's plan was modified slightly in as much as the sand was removed from the filter when the eggs began to hatch and varying amounts of fresh water were added up to five gallons per minute. During the experiment the temperature of the water in the closed system ranged from 3 to 13 degrees higher than it was in the remainder of the hatchery. The eggs in the closed system hatched between January 11 and February 12 while the remainder hatched between April 30 and May 21.

The experiment was not a success as the percentage loss in the eggs in the experimental group was higher than it was in the remainder, and the loss of fry due to blue sac and gill disease in the former was so heavy that the experiment was abandoned on May 3.

Copper sulphate treatment of lakes for the purpose of eliminating undesirable fish, which has been referred to in recent annual reports, was extended to Trefry's lake, Yarmouth county, Nova Scotia, in 1938. Trefry's lake has an area of 53.26 acres, a maximum sounded depth of 43 feet and an estimated average depth of 13.5 feet. It contained an estimated volume of 31,084,000 cubic feet of water. Treatment took place on August 6 under the direction of Dr. M. W. Smith, of the Atlantic Biological Station. The species composition of fish killed, the numbers, and the numbers and pounds of fish per acre were as follows:—

Species	Number in lake	Number per acre	Weight in lake, pounds	Pounds per acre	Average weight, gm.
<i>Ameiurus nebulosus</i> (Catfish or bullhead)	776	15	77.0	1.5	45.0
<i>Anguilla rostrata</i> (Eel)	3,262	61	140.3	2.6	19.5
<i>Fundulus diaphanus</i> (Killifish)	8,738	164	69.5	1.3	3.6
<i>Morone americana</i> (White perch)	11,761	221	456.6	8.6	17.6
<i>Notemigonus crysoleucas</i> (Golden shiner)	841	16	51.6	1.0	27.85
<i>Osmerus mordax</i> (Smelt)	4,424	83	21.7	0.4	2.2
<i>Perca flavescens</i> (Yellow perch)	1,360	26	71.6	1.3	23.9
<i>Pomolobus pseudoharengus</i> (Gaspereau)	4,346	82	51.2	1.0	5.4
<i>Pungitius pungitius</i> (Stickleback)	9				
Totals	35,517	668	939.5	17.7	

Lake Jesse, also in Yarmouth county, was treated in August, 1934, stocked with speckled trout in 1936 and 1937, closed to angling for three years and will be opened on April 15, 1939. Arrangements are being made to obtain an accurate census of the numbers and species of fish that may be caught for some weeks after the lake is opened.

Tedford and Boar's Back lakes which were also treated in August, 1936, were stocked with speckled trout fry on an acreage basis during the past season.

Two thousand five hundred coarse fish, mostly white and yellow perch, were trapped and destroyed at lake Annis and close to the same number at the Milo lakes, Yarmouth county, Nova Scotia. The traps were supplied by the department and were operated under the general direction of the superintendent of the Yarmouth hatchery. The Lake Annis trap (one) was tended by the owner-manager and those at the boys' camp "Mooswa." The (three) traps at the Milo lakes were tended by the members of the Milo Aquatic Club of Yarmouth.

As available information indicates that runs of sockeye salmon have never occurred in the streams of the easterly coast of Vancouver Island south of Seymour Narrows, a survey of the Nanaimo River system, with a view to ascertaining whether or not a sockeye run could be established there, was undertaken in 1932. As far as could be determined from a short summer investigation, physical conditions were found to be reasonably suitable for sockeye salmon production, but there were two adverse biological factors in an apparent paucity of plankton and a large trout population. Following this survey an experimental planting of eyed sockeye salmon eggs from the Rivers Inlet hatchery was made in March, 1933. These eggs were collected in the autumn of 1932.

In 1936, the fourth year after the eggs were taken, a gill-net was operated in the lower section of the river during July, August and September. Only three male sockeye were taken. Observations were continued in 1937 and 22 sockeye were caught. All were identified by their scales as five-year fish which had spent two years in fresh water. In addition to those that were caught and examined, the fishery guardian saw over 30 sockeye on July 30 and over 100 in August in a pool about five miles above the mouth of the river. Similar operations were carried on during the run of 1938 and 6 sockeye were taken. These were

identified by their scales as six-year fish. As the six specimens obtained were sufficient for examination no further effort was made to secure more salmon.

The appearance of sockeye in the Nanaimo river where they were not known to have occurred previously, in three consecutive years and of the same age each year would seem to be due to the planting of the eggs that were collected at Rivers Inlet in 1932.

The Supervisor of Fisheries for Eastern Nova Scotia reported that, generally speaking, the streams of the easterly part of Halifax county were affording better sport since they have been stocked with salmon fry. Quite a number of salmon were also reported in the Middle river, Gloucester county, where very few have been reported for the past twenty years. Middle river has been systematically stocked from the Restigouche hatchery since 1933. Trout angling in the streams and ponds of Prince Edward Island is also said to have been good. An eight and three-quarter pound sea trout, reported to be the largest ever taken in Prince Edward Island, was landed in May at Big Pond, Kings County.

Thirty-nine per cent of the seabago salmon that were taken during the collection of such eggs in 1938 at the Chamcook lakes, New Brunswick, had two fins missing, having been marked in this way before they were distributed a few years previously. Twenty-four per cent of the catch during similar operations during 1937, and thirty-nine per cent in 1936, bore the hatchery mark. These percentages indicate the importance of hatchery reared fish in maintaining seabago salmon angling in these waters.

Representative series of the fish produced at the Maritime Province hatcheries were exhibited at various exhibitions or contributed to displays made by provincial governments or by fish and game protective associations. These are referred to in the reports of the hatcheries that produced the fish.

The Canadian National, the Canadian Pacific and the Dominion Atlantic Railway companies continued their generous assistance and co-operation by furnishing free transportation for shipments of game fish and game fish eggs with their attendants. The extent of this co-operation is indicated in the following summary:

Railway	Total mileage on trip passes	Number of passages	Mileage baggage car permits			Number of cases or cans			Number of permits
			Full	Empty	Total	Full	Empty	Total	
C.N.R.....	344	4	2,217	1,207	3,424	61	37	98	25
C.P.R.....	2,044	12	923	799	1,722	36	34	70	14
D.A.R.....	254	4	127	24	151	16	10	26	3
	2,642	20	3,267	2,030	5,297	113	81	194	42

NOTE.—Number of passages refers to transportation one way—a return trip counting as two passages. Number of permits refers to one way passages for cases or cans.

The interest displayed in fish cultural operations by the general public has been most encouraging. The provincial fish and game protective associations co-operated as opportunity offered and local fish and game clubs, angling and protective associations have co-operated with and assisted hatchery staffs in distributing the season's output, particularly in waters in which these organizations are interested. The Fredericton branch of the New Brunswick Fish and Game Protective Association purchased a truck for this purpose last year. Among others that rendered valued and appreciated co-operation are the Fish and Game Protective Association, Madawaska county, and the associations of the Grand Falls, Yarmouth, Middleton, Coldbrook and Cobequid districts.

Prophylactic and sanitary measures to prevent the outbreak of disease were conducted on quite an extensive scale at all hatcheries and rearing ponds. Valuable and much-appreciated advice and co-operation were extended wholeheartedly by Doctors A. H. Leim, M. W. Smith and R. H. M'Gonigle (Pathologist), as well as by other members of the staffs of the Fisheries Research Board in the Maritime Provinces, all of which are referred to in the report of the board.

Several vacancies in the hatchery staffs at the beginning of the year were filled by the Civil Service Commission and several much-needed positions were created and filled also by the commission. Consequently, the fish cultural staff in the Maritime Provinces is in a much better position than it ever has been in regard to personnel.

The most important additions were the appointment of two assistants (District Supervisors of Fish Culture, Grade I), in the persons of Messrs. F. A. Tingley and A. P. Hills, to Mr. James Catt, District Supervisor of Fish Culture, Grade 2, for the Maritime Provinces. In addition to general inspections of fish cultural activities, these appointees will be employed in stream and lake surveys during the summer months. They have become fairly well acquainted with the situation in regard to fish cultural activities and requirements in the Maritime Provinces. During July and August they were stationed at the Atlantic Biological Station where they gained experience in laboratory technique, the copper sulphate treatment and survey of lakes under the supervision of the director and the scientific staff of the station. From September to December they were in the field engaged in general fish culture work. They then returned to the station where for over three months they received further instruction in chemistry, physics, fish anatomy, embryology, limnology, pathology, etc.

Expansion during the year consisted of a hatchery and superintendent's dwelling on the Charlo river, New Brunswick, at the site selected last year, a superintendent's dwelling at Grand lake, Nova Scotia, and a hatchery and superintendent's dwelling at Lindloff, Nova Scotia, details of which are given in the respective references to these establishments.

Collections, transfers and distributions are given to the nearest thousand in the summaries of operation at the respective establishments.

ANTIGONISH HATCHERY

K. G. Shillington, Superintendent

Production and receipt of eggs during the year were: Hatchery ponds, speckled trout eggs 8,955,000 and rainbow trout eggs 287,000; from Kelly's Pond hatchery 300,000 and Bedford hatchery 1,340,000 Atlantic salmon eyed eggs. Transfers and distributions were: Speckled trout eyed eggs to Bedford hatchery 750,000, to Cobequid hatchery 1,000,000, to Kelly's Pond hatchery 550,000 and to Department of Game and Fisheries, Toronto (exchange for salmon trout eyed eggs) 500,000; and rainbow trout eyed eggs to Lindloff hatchery 45,000. Distributions of advanced fry, fingerlings and older fish were: Atlantic salmon 1,499,000, speckled trout 1,758,000, and rainbow trout 26,000. Of the above 2,739 speckled trout were marked by the removal of the adipose and the right pectoral fins.

Feeding tests, which had as control rations 100 per cent beef liver and 100 per cent sardines (young herring), were carried on with six groups of speckled trout of the same age and observations were continued until the eggs produced by each group of trout were completely hatched. The highest average yield of eggs was from one group that received liver only while the highest percentage hatch was in the eggs produced by the group that was fed on fish. The other rations tested were plucks and fish, 50 per cent each; liver and fish,

50 per cent each; pigs' lungs, 90 per cent, and gaspereaux roe, 10 per cent; and liver, plucks, fish and roe in equal proportions. The smallest average yield of eggs was from the group that was fed lungs and roe and the highest percentage loss in eggs was from the group that was fed on liver only.

An additional 20-inch diameter intake pipe was laid and an improved screen was devised for the pond outlets. These screens have round iron bars at the bottom and are boarded in at the top. The draw of the water at the bottom of the screen facilitates the removal of debris and the cleaning of the ponds.

BEDFORD HATCHERY AND SACKVILLE RIVER SALMON RETAINING POND

George Heatley, Superintendent

The number of Atlantic salmon caught and eggs collected at the Sackville pond were considerably smaller than the numbers taken during 1937 and 1936, although the salmon taken were of greater average weight than those of previous years. A considerable percentage of the salmon captured at this point have been rather small. These small fish did not appear with the larger fish this year, their non-appearance at the usual time being attributed to their intermittent and casual ascent during the late summer and early autumn, before trapping for hatchery purposes began. One hundred and two salmon only were secured for the pond compared with 248 in 1937 and 329 in 1936. Three hundred and seventy-three thousand eggs of unusually good quality were taken and laid down in the Bedford hatchery. Collection and receipt of eggs at the Bedford hatchery were: from Sackville river pond 373,000 and from River Philip pond 2,384,000 Atlantic salmon eggs, and from the Antigonish hatchery 750,000 speckled trout eyed eggs. Transfers were: to Antigonish hatchery 1,340,000 Atlantic salmon eyed eggs, to Grand Lake rearing ponds 21,000 sebago salmon eyed eggs, to Dalhousie University 12,000 Atlantic salmon eggs and to Grand Lake rearing ponds 518,000 Atlantic salmon fry and fingerlings. Distributions of advanced fry and fingerlings were: Atlantic salmon 780,000 and speckled trout 552,000.

COBEQUID HATCHERY AND RIVER PHILIP SALMON-RETAINING POND

J. W. Heatley, Superintendent

Collections of eggs were: Speckled trout from Hart lake 181,000 and hatchery ponds 6,000; Atlantic salmon from River Philip 3,568,000. One million speckled trout eyed eggs were received from the Antigonish hatchery and 10,000 speckled trout No. 3 and No. 4 fingerlings were transferred to the Grand Lake rearing ponds. Distributions were: 1,849,000 Atlantic salmon and 742,000 speckled trout. Sixteen thousand speckled trout fingerlings were marked by the removal of the adipose and right ventral fins.

The collection of speckled trout eggs at Hart lake was disappointing in view of the experience of the previous years. Reports indicated that quite a large number of trout were taken by anglers in this lake during the summer which may account for the comparatively small size of the fish that were caught for hatchery purposes and for the fact that only 18 of the 811 that were marked in 1937 were observed by the egg-collecting staff. Marking was continued and the right ventral fin was removed from all the Hart lake trout—570 in number—that were handled during 1938. The 6,000 eggs were from trout that were caught in Poison lake and River Philip and transferred to the hatchery ponds in November, 1938.

A large run of Atlantic salmon occurred in River Philip. Assistant C. Sayer was in charge of operations. The first fish entered the hatchery trap on September 21 and 1,520 were impounded by November 1, after which the fences

were opened and the balance of the run permitted to ascend. A considerable number were observed passing over the dam after the fences were removed and 158 of those impounded were liberated unstripped as sufficient eggs to meet requirements, namely 5,952,000, had been secured; 2,384,000 were laid down at the Bedford hatchery and 3,568,000 at the Cobequid hatchery. Five hundred stripped salmon were marked by attaching a numbered tag to their dorsal fin.

In December electric power became available and was installed. The Cobequid power plant was dismantled and transferred to the new Lindloff hatchery. The circular rearing ponds continued to leak and several kinds of water-proofing materials were tested.

COLDBROOK REARING PONDS

E. Barrett, Superintendent

The Coldbrook rearing ponds, which were opened in 1938, received 350,000 speckled and 15,000 salmon trout No. 1 fingerlings from the Middleton hatchery. Considerable loss was experienced during the season and distributions, which were completed before the end of September, consisted of 108,000 speckled trout of an average length of $4\frac{1}{2}$ inches. The property was enclosed and the grounds further improved.

GRAND LAKE REARING PONDS

J. M. Butler, Superintendent

Most of the two-year old sebago salmon reared in the ponds were immature, and the eggs obtained from them, as well as from older pond fish, were of poor quality. Traps were again operated at Waverley run and Rawdon river. Very few sebago made their appearance, only 45 being taken at both places, of which 14 were females. Their average weight was three pounds and the collection amounted to only 13,000 eggs.

Twenty-one thousand sebago salmon eyed eggs and 518,000 Atlantic salmon fry and fingerlings were received from the Bedford hatchery, and 10,000 speckled trout fingerlings from the Cobequid hatchery. The latter group will be carried at Grand lake through the winter and distributed next spring. A representative series of the sebago salmon of different ages available from the hatchery ponds were supplied the University of Toronto for study in connection with the investigation of the landlocked salmon of the Maritime Provinces, particularly as to their having heritable characters different from those of the sea salmon.

A dwelling of bungalow type, thirty feet square, with full basement, verandah across the front and summer kitchen, was built for the Superintendent. It provides a living room, dining room, kitchen, bathroom and five bedrooms.

Considerable repairs were made to the ponds; the whole series was enclosed by a mink-proof fence, and the grounds generally were improved.

Distributions for the season amounted to 507,000 Atlantic salmon.

KEJIMKUJIK REARING PONDS

F. F. Annis, Superintendent

The Kejimkujik rearing ponds were opened on April 26, some fifteen days earlier than was the case last year. They received from the Yarmouth hatchery 250,000 speckled trout advanced fry and 100,000 Atlantic salmon advanced fry, the last on May 26. The trout made satisfactory growth until July 22 when they were attacked by fin disease which they appear to have contracted from fish in the water supply above the ponds. Further trouble was caused by the high temperature combined with the low oxygen content of the water and

heavy losses in the trout continued until lower water temperatures occurred on August 21. As compared with the trout, the salmon did well. They were not affected by disease and they made satisfactory growth.

Distributions, which were completed on September 27, were: Atlantic salmon 95,000 and speckled trout 70,000.

Considerable improvement was made to the grounds.

LINDLOFF HATCHERY

Wm. T. Owens, Superintendent

The following eyed eggs were received: 200,000 speckled trout from the Margaree, 600,000 Atlantic salmon from the Miramichi and 45,000 rainbow trout from the Antigonish hatcheries. Slightly over 126,000 speckled trout ova were collected at McRae lake, which is an increase over the collection of the previous year, and 1,050,000 Atlantic salmon eggs were received from the Margaree salmon retaining pond. All species made good growth and the survival of speckled trout compared favourably with previous years. Distributions were: Atlantic salmon 419,000, rainbow trout 22,000 and speckled trout 184,000. Of these 10,000 salmon and 1,000 speckled trout were marked by the removal of the adipose and left pectoral fins.

In December 361 speckled trout were caught in a nearby brook and placed in the hatchery ponds with the idea of developing this local strain as the nucleus of a brood stock.

A hatchery, 25 feet by 65 feet over all, embodying a hatching room, 25 feet by 52 feet 5 inches, equipped with 30 troughs 16 feet long, office, feed room and coal room, was built as well as a superintendent's dwelling of a semi-bungalow type, 30 feet square, with a verandah extending across the front, full basement, living room, dining room, kitchen, bathroom, five bedrooms and summer kitchen.

Increased numbers of salmon smolt and parr were reported in Grand river as well as improved angling for trout in the east and west branches of the Tillard river.

MARGAREE HATCHERY

W. D. Turnbull, Superintendent

Over 3,000,000 speckled trout eggs were obtained from hatchery stock and 4,362,000 Atlantic salmon eggs were received from the Margaree salmon retaining pond. Two hundred thousand speckled trout eyed eggs were transferred to the Lindloff hatchery and distributions were: Atlantic salmon 2,828,000 and speckled trout 2,150,000. Eleven thousand seven hundred and ninety-nine Atlantic salmon fingerlings and 4,530 speckled trout of various ages were marked by the removal of the adipose and right pectoral fins. Several feeding experiments were made. One group of yearling speckled trout were not given any artificial food from December 20 to April 15 following. This group lost 16 per cent of their original weight while another group of the same number and age, retained under similar conditions, which were fed in the usual way, increased their weight by 26 per cent during the same period. The grounds and rearing pond facilities were further improved. Low lying land was filled in, and a gasoline tank and pump installed. Angling in the waters stocked from this hatchery is reported to be improving, particularly in the Margaree river and lake O'Law.

MARGAREE SALMON RETAINING POND

J. P. Chiasson, Superintendent

In accordance with the usual practice, salmon for the Margaree salmon retaining pond were purchased from the Margaree Harbour Salmon Fisheries Association whose net was operated intermittently for fish cultural purposes from September 19 to October 19.

In the interest of the anglers in the river above, the association's net was not set until September 19. It was operated for three days, September 19 to 21 inclusive, during which 30 salmon were caught, all of which were placed in the salmon retaining pond. During the next four days from September 22 to 25 inclusive, the net was lifted and the river was open to the ascent of fish. During the next four days, September 26 to 29 inclusive, the net was fished and 117 salmon were caught all of which were placed in the retaining pond. Ninety-seven caught from September 30 to October 2 inclusive were tagged and liberated above the net. During the remainder of the season the net was fished continuously but half of the salmon taken each day were liberated above the net and the remainder were placed in the pond.

One hundred and twenty salmon were caught on October 3, half of which, or 60, were tagged and liberated. Three hundred and fourteen were caught on October 4, half of which, 157 were liberated, 43 of them being tagged. In all, 200 salmon caught from September 30 to October 4 inclusive were tagged and liberated above the net on October 3 and 4. During the whole of the season 758 salmon were impounded and 644 were liberated. One thousand four hundred and two salmon passed through the association's net, which is the largest number on record in any year since the net was first operated in 1909.

Altogether only 11 or 5½ per cent of the 200 tagged salmon were recaptured up to the end of the angling season on October 15. Three of these fish were found in the retaining pond during stripping operations. The remainder, eight or four per cent, were taken by anglers. Three of those that were tagged on October 3 were taken two days later on October 5, two in McDaniel's pool six miles distant and one in Thornbush pool seven and one-half miles distant. One tagged on October 3 was taken in Thornbush pool three days later. One tagged on October 4 was taken in McDaniel's pool four days later. One tagged on October 3 was taken in Hut pool seven and one-quarter miles distant five days later. Two tagged on October 3 were taken in McDaniel's pool one of them six days later and the other ten days later.

Of the eight recaptured by anglers, seven were tagged on October 3 and one only on October 4. The distance that they travelled from the time they were tagged until they were recaptured ranged from six to seven and one-half miles. Those that were tagged and recaptured by anglers happen to have been liberated as a sharp freshet was subsiding. The freshet, as recorded at Frizzleton, was on October 1 and 2 and dropped abruptly on October 3. The salmon were liberated on (1) the morning of October 3 (2) the afternoon of October 3 and (3) on October 4. Of the first group six (six per cent) were taken by anglers, three on October 5 and one on October 6, six and seven and one-half miles up the river but none were caught at a greater distance although taken as late as October 13. Of the second group one fish (1.6 per cent) was taken by angling and of the third group also one fish (2.3 per cent) but neither of these was as far up the river as those referred to previously. The availability to the anglers of the salmon that were liberated on October 3 and 4 would seem to have been due to the tagging and liberation having been so closely related to the freshet at Frizzleton which no doubt tended to bring these salmon up the river. All of these fish were marked during their autumn ascent to the spawning grounds and the small percentage of recaptures made by anglers, namely four per cent, is an indication of the effect that this net was late in the season on the angling in the river above.

Ten salmon were lost during the operating period, September 19 to December 5. All eggs taken were transferred, 4,362,000 to the Margaree and 1,050,000 to the Lindloff hatcheries.

DEPARTMENT OF FISHERIES

MERSEY RIVER REARING POND

T. K. Lydon, Officer-in-Charge

The lower pool in the fishway at No. 3 Development, Mersey river, was fitted up and used experimentally as a rearing pond for salmon. The pool was securely screened against the entry of eels, none of which were observed in the pool during or at the end of the season.

Ninety thousand Atlantic salmon No. 1 fingerlings were transferred from the Middleton hatchery and placed in this pool between July 8 and 11. The growth during the 83 days that the salmon were in the pool was quite satisfactory, some of those distributed on September 29 being five inches long. The total production of 64,600 fingerlings was distributed in the Mersey River system.

MIDDLETON HATCHERY, STEVENS PONDS, NICTAUX SALMON POND AND
REARING STATION*F. M. Millett, Superintendent*

While a larger number of speckled trout were caught at Sand lake, they were of smaller size than were those taken during the last two seasons and they were also in poor condition. The collection of eggs was consequently smaller, amounting to 81,000. Five hundred thousand salmon trout (eyed) eggs (an exchange) were received from the Department of Game and Fisheries, Toronto, Ontario; 101,000 Atlantic salmon eggs from the Nictaux pond and 1,100,000 (eyed) from the Miramichi hatchery. One million three hundred and twenty-seven thousand speckled trout (eyed) eggs were purchased from the Brookdale Trout Company.

In so far as the hatching, rearing and distribution of trout and salmon are concerned, the Middleton hatchery, Stevens ponds and Nictaux rearing station are operated more or less as one unit. The ponds and rearing station receive their annual supplies of fry and eggs from or through the Middleton hatchery. The collection of salmon eggs at the Nictaux pond was quite disappointing. The expected number of salmon did not appear, the total number impounded being 83 only, and the total collection of eggs slightly under 101,000. Thirty-seven of the salmon were marked by tags attached to their dorsal fins.

The Nova Scotia Light and Power Company, Limited, who operate a power station on the Nictaux river, immediately below the rearing station, co-operated closely with the department in facilitating the safe descent of salmon smolt by closing down their power plant from May 24 to July 1. No. 1 fingerlings to the extent of 350,000 speckled trout and 15,000 salmon trout were transferred to the Coldbrook ponds and 90,000 Atlantic salmon to the Mersey River rearing station.

Distributions from the Middleton hatchery were: 483,000 Atlantic salmon, 294,000 salmon trout and 712,000 speckled trout, and from the Nictaux rearing station 701,000 Atlantic salmon, advanced fry and fingerlings. Three thousand salmon fingerlings from the Nictaux rearing station and 7,000 from the Middleton hatchery were marked by the removal of the adipose and left ventral fins and distributed in the Gaspereau river.

YARMOUTH HATCHERY

H. V. Gates, Superintendent

Larger than usual losses in speckled trout fingerlings were caused by high water temperatures that prevailed during the greater part of the summer. The selected stock developed at the hatchery recovered more quickly and were much larger at the end of the season than those hatched from eggs from other sources.

One hundred and forty-seven thousand speckled trout eggs and 33,000 rainbow trout eggs were obtained from the fish in the hatchery ponds, and 720,000 speckled trout (eyed) eggs were purchased from the Brookdale Trout Company. Two hundred and fifty thousand speckled trout and 100,000 Atlantic salmon (advanced fry) were transferred to the Kejimikujik rearing ponds. Distributions were: 659,000 Atlantic salmon, 24,000 rainbow trout and 851,000 speckled trout, made up of fry, fingerlings and older fish. The Fisheries Research Board received 10,000 speckled trout No. 1 fingerlings. One thousand three hundred and thirty-nine speckled trout—one and two years old—were marked by the removal of the adipose and right ventral fins. Representative series of the fish at the hatchery were contributed to displays made at the Nova Scotia Fisheries Exhibition, Lunenburg, and at the Yarmouth county and the Municipality of Clare exhibitions.

FLORENCEVILLE HATCHERY

George Sutherland, Superintendent

Although the production of speckled trout eggs from the hatchery ponds was not as large as was expected—considering the number of fish that were handled—it amounted to 2,796,000, which is approximately 400,000 larger than the collection of 1937. One million two hundred and fifty-eight thousand Atlantic salmon eggs (green) were received from the St. John salmon retaining pond; 1,000,000 (eyed) from the Miramichi and 30,000 (eyed) from the Restigouche hatcheries. Speckled trout eggs (eyed) were transferred; viz., 400,000 to Grand Falls, 100,000 to Restigouche and 200,000 to Miramichi. One million four hundred and fifty-seven thousand Atlantic salmon and 621,000 speckled trout advanced fry, fingerlings, yearlings and older fish were distributed in the lakes and streams of the district. Six thousand two hundred and fifty-one speckled trout yearlings and older fish were marked by the removal of the adipose and left pectoral fins. Representative series of the fish at the hatchery were contributed to the displays made respectively by the Fredericton and Carleton branches of the New Brunswick Fish and Game Protective Association at the Fredericton and Woodstock exhibitions. Nutritional tests were carried on in relation to the yield and quality of the eggs produced by trout fed in different ways. Minor repairs, as necessary, were made to the buildings.

GRAND FALLS HATCHERY

W. A. McCluskey, Superintendent

The number of speckled trout eggs obtained from Fraser's pond, Three brooks, was disappointing in comparison with numbers obtained during the two preceding years. This decrease is attributed to the younger average age and smaller size of the trout that were available. The collection amounted to 659,000 eggs, as compared with over 1,166,000 in 1937 and 1,720,000 in 1936. One million five hundred and seven thousand Atlantic salmon (green) eggs were received from the St. John pond and 221,000 (eyed) from the Restigouche hatchery; 400,000 speckled trout (eyed) eggs from the Florenceville hatchery and 100,000 speckled trout (eyed) eggs, as a present for purposes of comparison, from the American Fish Culture Company, and 500,000 speckled trout (eyed) were purchased from the Brookdale Trout Company of Massachusetts. Two million four hundred and forty-five thousand Atlantic salmon and 1,238,000 speckled trout were distributed. Forty-two thousand salmon (Restigouche stock) and 2,000 speckled trout were marked by the removal of the adipose and right pectoral fins. Several diets were tested in the feeding of speckled trout fingerlings.

MIRAMICHI HATCHERY AND MIRAMICHI SALMON-RETAINING POND

Frank Burgess, Superintendent

This hatchery and pond are operated more or less as a unit under the same staff. One thousand eight hundred and twenty-six salmon, purchased by tender from the late summer and early autumn run, were impounded between September 9 and October 1. They did extremely well during retention, suffering a loss of only eleven fish. The production of 8,565,000 eggs was eyed at the Miramichi hatchery. The following transfers from eggs laid down the fall of 1937 were made: to Florenceville hatchery 1,000,000, Lindloff hatchery 600,000, Middleton (Nictaux Falls) hatchery 1,100,000. Two hundred thousand speckled trout eyed eggs were received from Florenceville. Three million eight hundred and fourteen thousand Atlantic salmon and 123,000 speckled trout were distributed. Fourteen thousand nine hundred and forty Atlantic salmon fingerlings were marked by the removal of the adipose and right ventral fins. Some feeding tests were also carried on, and the grounds and surroundings were further improved.

NEW MILLS SALMON RETAINING POND

William White, Superintendent

Four hundred and thirteen salmon of the early run were purchased from the commercial fishermen of the district and delivered between May 21 and July 22. Throughout the whole of the season a loss of only three salmon occurred. Over 1,821,000 eggs were produced and laid down in the newly constructed hatchery, at the mouth of the Charlo river.

RESTIGOUCHE HATCHERY, FLATLANDS, CHARLO HATCHERY, CHARLO

R. O. Barrett, Superintendent

The original salmon hatchery on the Restigouche river, established in 1874, was one of the first fish-breeding establishments operated by the Dominion Government in the Maritime Provinces. Operations were first carried on at Deeside and were later moved to Flatlands. As the Flatlands hatchery was of limited capacity, and the site and water supply did not permit of an expansion of the hatching and rearing facilities, it was closed at the end of the 1938 distribution season, and all suitable equipment was moved to the new hatchery, just completed, at the mouth of the Charlo river. The hatchery at Flatlands during 1938 received 1,328,000 Atlantic salmon eyed eggs from Kelly's pond and 100,000 speckled trout eyed eggs from the Florenceville hatchery. Two hundred and twenty-one thousand Atlantic salmon eyed eggs were transferred to Grand Falls and 30,000 to the Florenceville hatchery. Two million five hundred and thirty-one thousand Atlantic salmon and 74,000 speckled trout fry and fingerlings were distributed.

The Charlo hatchery, at the mouth of the river of the same name, in Restigouche county, New Brunswick, was opened on October 22, when it received its first Atlantic salmon eggs. In all 1,821,000 were received from the New Mills pond. This new plant consists of a main hatchery, 37 feet 8 inches by 63 feet, which includes a hatching-room, coal-room, office and toilet with storage space overhead for equipment; an auxilliary hatchery, 28 feet 8 inches by 68 feet 6 $\frac{3}{4}$ inches, including a hatching-room, storeroom and coal-room with storage space overhead; a building 21 feet by 65 feet, containing a double garage, ice-house, workroom, feed-room, cold storage with storage space above; and a superintendent's dwelling of the bungalow type, 30 feet square, with full basement, living-room, dining-room, kitchen, bathroom and five bedrooms, a verandah across the front and a summer kitchen at the rear. The hatching-room in the

main hatchery is 37 feet 8 inches by 51 feet 2 inches, and is equipped with forty hatching troughs, 20 feet long 10½ inches wide and 6½ inches deep, and sixteen floor troughs, 20 feet 6½ inches long, 24 inches wide and 9 to 12 inches deep. The auxiliary hatching-room is 28 feet 8 inches by 61 feet 5 inches, and is equipped with twenty-one hatching troughs, 20 feet long, 20½ inches wide and 10 inches deep. The water supply is taken from Charlo falls, on the south branch of the Charlo river, where a concrete headworks is provided. From this point a pipe 18 inches in diameter conveys the water some 1,720 feet to the hatcheries, adjacent to which an extensive system of rearing ponds is contemplated. The drains for sixteen circular ponds were completed in 1938. Light is supplied to all buildings by a thirty-two volt electric light plant with a 1,500 watt generator and 240 ampere hour storage batteries.

ST. JOHN HATCHERY, ST. JOHN SALMON RETAINING POND, AND CHAMCOOK LAKES
EGG COLLECTING STATION

J. D. Nichol, Superintendent

The collection of speckled trout eggs from the hatchery ponds this season was slightly over 1,803,000, being nearly 200,000 larger than the collection of 1937. This collection was supplemented by a present of 10,000 speckled trout eyed eggs (special stock) from the American Fish Culture Company, 1,204,000 Atlantic salmon eggs from the St. John pond, and 113,000 sebago salmon eggs from the Chamcook lakes. Distributions were: 924,000 Atlantic salmon, 69,000 sebago salmon and 718,000 speckled trout and small groups of brown trout hybrids, ouananiche and rainbow trout, yearlings and older fish. Atlantic salmon eggs and fingerlings were supplied Dr. A. G. Huntsman and the Fisheries Research Board as required. Representative series of the fish at the hatchery were forwarded the Bureau of Information and Tourist Travel for the display made by the Province of New Brunswick at the Sportsmen's Shows at Boston and New York. This fish display was in charge of Assistant Wm. T. Owens, of the St. John hatchery. Similar series were supplied the St. John branch and Moncton branch of the New Brunswick Fish and Game Protective Association for displays made by them respectively at the St. John and Moncton exhibitions. Twenty-two thousand six hundred and twelve sebago and ouananiche salmon, 1,264 rainbow trout and 9,542 speckled trout were marked by the removal of the adipose and one other fin. Feeding tests were carried on with speckled trout with a view to finding a diet best suited towards a large production of eggs of good quality. The St. John salmon pond was in charge of Assistants T. K. Lydon and N. J. Lamb. One thousand two hundred and thirteen salmon were purchased from the commercial weir fishermen of St. John harbour for this pond. Low water and high temperatures contributed to a heavy loss in these fish during the summer months. Three million nine hundred and sixty-nine thousand eggs were produced and allotted, as follows: Florenceville 1,258,000, Grand Falls 1,507,000, and St. John 1,204,000. Numbered tags were affixed to the dorsal fins of 657 salmon which were liberated in St. John harbour at the close of the season.

The collection of eggs at the Chamcook lakes was in charge of Assistant T. K. Lydon. One hundred and seventy-one sebago salmon, i.e., 98 males and 73 females, were taken. Sixty-seven of these fish, or 39.1 per cent of the number taken, had two fins missing, having been marked in this way when they were distributed. The numbers of marked sebago salmon in these lakes are referred to elsewhere in this report. A fairly representative series of the sebago salmon of these waters was supplied Mr. D. G. Wilder, University of Toronto, for study in regard to the question of the landlocked salmon of the Maritime Provinces having heritable characters different from those of the sea salmon. Feeding tests were carried on with a view to finding a diet conducive to a large production of speckled trout eggs of good quality.

KELLY'S POND HATCHERY AND MORELL RIVER SALMON RETAINING POND

F. C. Hayley, Superintendent

The collection of speckled trout eggs was smaller than it was in the previous year; 65,000 were obtained from York pond, 186,000 from Watts pond and smaller numbers from Andrews and the hatchery ponds. The first three mentioned ponds are privately owned. The eggs as collected there were laid down in the Kelly's pond hatchery and only those that reached the eyed stage were paid for. Five hundred and fifty thousand speckled trout eyed eggs were received from the Antigonish hatchery and 100,000 rainbow trout eggs, also eyed, from the Cape Cod Trout Company. One million five hundred and fifty-nine thousand Atlantic salmon (green) eggs were received from the Morell pond. Transfers of Atlantic salmon eyed eggs collected in 1937 were: 1,328,000 to the Restigouche hatchery and 300,000 to Antigonish hatchery; 501,000 speckled trout and 95,000 rainbow trout advanced fry and fingerlings were transferred to the Cardigan ponds. Five hundred and eighty-three thousand Atlantic salmon and 208,000 speckled trout advanced fry and fingerlings were distributed. Twenty-four thousand three hundred and sixteen speckled trout fingerlings were marked by the removal of the adipose and left pectoral fins and distributed in Vessey brook, tributary to Winter river. Operations at the Morell pond were at first in charge of J. J. Hayley and were taken over by Superintendent Tait when the Cardigan ponds were closed for the season. The first salmon were caught on October 10 and between that date and November 14 four hundred and forty-three were impounded. The loss during retention was only one salmon. The total collection of 1,559,000 eggs was placed in the Kelly's pond hatchery.

CARDIGAN REARING PONDS

A. Tait, Superintendent

The Cardigan rearing ponds, which were built in 1937, were ready for operation towards the end of May and received 95,000 rainbow trout and 501,000 speckled trout advanced fry and fingerlings from the Kelly's Pond hatchery. The operations for the initial season were very satisfactory. Distributions which were completed on October 25 consisted of 92,000 rainbow trout and 370,000 speckled trout fingerlings. The property was enclosed and general improvement thereof was begun.

STATEMENT BY SPECIES, OF LOCAL COLLECTION AND DISPOSAL OF EGGS DURING 1938

Species	Collection area	First and last eggs	Number collected	Disposal—Establishment at	Number	Totals
Atlantic salmon	Margaree pond, N.S.	Nov. 11-Dec. 5.	5,412,000	Lindlof.	1,050,000	
	Nictaux pond, N.S.	Nov. 7-17.	100,956	Margaree.	4,302,000	
	River Philip, N.S.	Nov. 7-18.	5,951,850	Middleton.	100,956	
	Sackville river, N.S.	Nov. 3-10.	373,500	Bedford.	2,384,250	
	Miramichi pond, N.B.	Oct. 18-Nov. 11.	8,504,973	Cobequid.	3,567,600	
	New Mills pond, N.B.	Oct. 21-Nov. 11.	1,821,633	Bedford.	373,500	
	St. John pond, N.B.	Oct. 26-Nov. 9.	3,969,105	Miramichi.	8,504,973	
	Morell river, P.E.I.	Nov. 8-22.	1,559,500	Charlo.	1,821,633	
Sebago salmon.	Chamcook lakes, N.B.	Nov. 8-18.	113,274	Florenceville.	1,258,145	
	Grand lake, N.S.	Nov. 8-Dec. 10.	13,000	Grand Falls.	1,506,890	
	Grand lake rearing ponds, N.S.	Nov. 8-30.	48,400	St. John.	1,204,070	
	Grand lake rearing ponds, N.S.	Nov. 8-19.	3,800	Kelly's pond.	1,559,500	27,753,517
	Antigonish hatchery ponds, N.S.	Nov. 19-Apr. 25.	286,700	St. John.	113,274	
	Yarmouth hatchery ponds, N.S.	Mar. 26-Apr. 24.	33,000	Grand lake.	13,000	
	Anderson lake, B.C.	Oct. 25-29.	1,050,000	Grand lake.	48,400	174,874
	Antigonish hatchery ponds, N.S.	Nov. 1-Dec. 20.	7,924,060	Grand lake.	3,800	3,800
	Margaree hatchery ponds, N.S.	Oct. 16-Nov. 21.	(b) 1,030,500	Antigonish.	286,700	
	Hart lake, Colchester and Cumberland Cos., N.S.	Nov. 2-7.	(b) 2,381,647	Yarmouth.	33,000	319,700
	Poison lake and River Philip, Cumberland Co., N.S.	Week Dec. 3.	6,000	Anderson lake.	1,050,000	1,050,000
	McRae lake, Richmond Co., N.S.	Oct. 4-17.	126,534	Antigonish.	8,954,560	
	Sand lake, Annapolis Co., N.S.	Nov. 7-17.	81,180	Margaree.	3,024,565	
	Yarmouth hatchery ponds, N.S.	Nov. 3-24.	90,000	Cobequid.	181,124	
	Florenceville hatchery ponds, N.B.	Oct. 7-Dec. 24.	2,539,464	Cobequid.	6,000	
	St. John hatchery ponds, N.B.	Oct. 24-Dec. 5.	1,343,684	Lindlof.	126,534	
	Kelly's pond hatchery pond, P.E.I.	Dec. 13.	4,000	Middleton.	81,180	
				Yarmouth.	147,000	
				Florenceville.	2,796,364	
				St. John.	1,803,414	
				Kelly's pond.	4,000	17,124,741
						46,426,432

(b) Eggs from yearling fish.

EYED EGGS PURCHASED IN 1938

Species	Month laid down	Purchased from	Laid down in hatchery	Number received	Total by species
Rainbow trout.....	April.....	Cape Cod Trout Company, Wareham, Mass.....	Kelly's pond.....	100,000	100,000
Speckled trout.....	December 1938, January 1939.....	Brookdale Trout Company, Kingston, Mass.....	Middleton.....	1,327,435	
	December.....	Brookdale Trout Company, Kingston, Mass.....	Yarmouth.....	720,000	
	December.....	Brookdale Trout Company, Kingston, Mass.....	Grand Falls.....	500,000	
	October, November.....	Donald Fraser, Plaster Rock, N.B.....	Grand Falls.....	459,770	
	November, December.....	Harold Watts, York, P.E.I.....	Kelly's pond.....	255,348	3,262,553
					3,362,553

Summary of eggs received: Eggs collected, 46,426,432; Eggs purchased 3,362,553; total 49,788,985.

EXCHANGED OR DONATED EYED EGGS RECEIVED 1938

From Department of Game and Fisheries, Toronto, Ontario, in exchange for speckled trout:—

Salmon trout from Wiarton hatchery, laid down at Middleton hatchery..... 500,000

From American Fish Culture Company, Carolina, Rhode Island, donated:—

Speckled trout, laid down at Grand Falls hatchery..... 100,000

Speckled trout, laid down at St. John hatchery..... 10,000

In the interest of economy and convenience in the distribution of fry the following transfers of eyed eggs were made in 1938:—

Species	From	To	Number	Date received
Atlantic salmon.....	(a) Bedford.....	Antigonish.....	1,340,000	March 10, 16
	(a) Middleton.....	Nictaux Falls.....	680,075	April 1
	(a) Miramichi.....	Lindloff.....	600,000	April 1
	(a) Miramichi.....	Nictaux Falls.....	1,100,000	April 2
	(a) Miramichi.....	Florenceville.....	1,000,000	March 24
	(a) Restigouche.....	Florenceville.....	30,186	March 16
	(a) Restigouche.....	Grand Falls.....	221,364	March 16
	(a) Kelly's Pond.....	Antigonish.....	300,000	February 26
	(a) Kelly's Pond.....	Restigouche.....	1,328,000	February 4
	(b) Antigonish.....	Lindloff.....	45,000	May 29
Rainbow trout.....	(a) Antigonish.....	Grand Lake.....	21,390	April 22
Sebago salmon.....	(a) Bedford.....	Bedford.....	750,000	March 5
Speckled trout.....	(a) Antigonish.....	Cobequid.....	1,000,000	April 1
	(a) Antigonish.....	Kelly's Pond.....	550,000	March 4
	(a) Margaree.....	Lindloff.....	200,000	March 12
	(a) Florenceville.....	Grand Falls.....	400,000	March 9
	(a) Florenceville.....	Miramichi.....	200,000	March 18
	(a) Florenceville.....	Restigouche.....	100,000	March 17

(a) 1937 fall collection.

(b) 1938 collection.

TAGGING AND MARKING OF FISH

The tagging of Atlantic salmon taken for fish cultural purposes, which was commenced in 1913, was continued on a somewhat larger-than-usual scale in 1938 at the several salmon retaining ponds in the Maritime Provinces. The adipose and one ventral or one pectoral fin was removed from 191,902 Atlantic and sebago salmon, ouananiche, rainbow and speckled trout before they were distributed. The object of the tagging is to add to present information in regard to the movements of the fish, frequency in spawning and the extent to which early salmon of any season return to fresh water as early fish or vice versa. The marking or fin clipping was practised for the purpose of gaining further information on the movements, growth and survival of hatchery product. Special reference is made to the tagging and liberation of fish from the net operated by the Margaree Harbour Salmon Fisheries Association under "Margaree salmon retaining pond." The extent of the tagging is given in detail in the following statement:—

ADULT ATLANTIC SALMON, TAGGED BY AFFIXING TAGS TO THE DORSAL FIN, 1938

—	Number tagged	Type of tag	Period of tagging	Where liberated
<i>Nova Scotia—</i>				
Margaree pond.....	200	Aluminum...	October 3, 4.....	Margaree river, immediately above Salmon Fisheries Association net.
Nictaux Falls pond.....	37	Aluminum...	November 11, 17...	Nictaux river.
River Philip pond.....	500	Aluminum...	November 8-14....	River Philip.
<i>New Brunswick—</i>				
St. John pond.....	657	Aluminum...	November 5-15....	St. John Harbour.

(1) The recaptures of tagged Atlantic salmon reported during 1938, (2) of all tagging done and of all recaptures of tagged salmon reported since tagging was initiated in 1913 to December 31, 1938, are as follows:—

TABLE No. 1
RECAPTURES, 1938—ATLANTIC SALMON
MARGAREE RIVER, N.S.

Number	Weight (lbs.)	Length (ins.)	Condition	Sex	Date	1. Where liberated 2. Where caught
F7814	7 20½	31	Kelt..... Clean.....	F F	Nov. 25, 1936 July 27, 1938	Margaree Pond, N.S. McArras Brook, Antigonish county, N.S.
F7827	14 24	37 41	Kelt..... Clean.....	F F	Nov. 25, 1936 July 21, 1938	Margaree Pond, N.S. One and one-half miles north of Margaree Harbour, N.S.
F7838	15 (z) (u) 22	38 41	Kelt..... Clean.....	F F	Nov. 25, 1936 1938	Margaree Pond, N.S. (a) Margaree Pond, N.S.
F7843	7 (v) 30	31	Kelt..... Clean.....	F F	Nov. 25, 1936 July 25, 1938	Margaree Pond, N.S. Broad Cove Chapel, Inverness county, N.S.
F7866	10 (z) (u) 21	34 41	Kelt..... Clean.....	F F	Dec. 1, 1936 1938	Margaree Pond, N.S. (a) Margaree Pond, N.S.
F7885	14 21	38 41	Kelt..... Clean.....	F F	Dec. 1, 1936 July 30, 1938	Margaree Pond, N.S. West of Point Cross brook out- let, Inverness county, N.S.
F7888	17 32	37 44	Kelt..... Clean.....	F F	Dec. 1, 1936 June 6, 1938	Margaree Pond, N.S. Pigeon Island, two miles from Lead Cove, Newfoundland.
F7965	10 27	33 40	Kelt..... Clean.....	M M	Dec. 10, 1936 Aug. 6, 1938	Margaree Pond, N.S. One hundred yards west of Ferguson's ponds outlet, Pictou county, N.S.
(f)K131	.....	.....	Clean.....	F	Oct. 3, 1938	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	18	.....	Clean.....	F	Oct. 5, 1938	Thornbush pool, Margaree river, N.S.
(f)K204	.....	.....	Clean.....	.....	Oct. 3, 1938	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	8	.....	Clean.....	.....	Oct. 6, 1938	Thornbush pool, Margaree river, N.S.
(f)K210	.....	.....	Clean.....	M	Oct. 3, 1938	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	7	.....	Clean.....	M	Oct. 5, 1938	McDaniel pool, Margaree river, N.S.
(f)K216	.....	.....	Clean.....	M	Oct. 3, 1938	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	16½	.....	Clean.....	M	Oct. 5, 1938	McDaniel pool, Margaree river, N.S.
(f)K238	.....	.....	Clean.....	.....	Oct. 3, 1938	Margaree Salmon Fisheries As- sociation net, Margaree Har- bour, N.S.
	9½	.....	Clean.....	.....	Oct. 13, 1938	McDaniel pool, Margaree river, N.S.

TABLE No. 1—Continued

RECAPTURES, 1938—ATLANTIC SALMON—Continued

MARGAREE RIVER, N.S.

Number	Weight (lbs.)	Length (ins.)	Condition	Sex	Date	1. Where liberated 2. Where caught
(f)K239			Clean.....		Oct. 3, 1938	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	10 to 12		Clean.....		Oct. 8, 1938	Hut pool, Margaree river, N.S.
(f)K261			Clean.....	M	Oct. 3, 1938	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(z) (u) 7	30	Clean.....	M	1938	(e) Margaree Pond, N.S.
(f)K266			Clean.....	M	Oct. 4, 1938	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(z) (u) 7	30	Clean.....	M	1938	(e) Margaree Pond, N.S.
(f)K272			Clean.....	F	Oct. 4, 1938	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	10		Clean.....	F	Oct. 8, 1938	McDaniel pool, Margaree river, N.S.
(f)K280			Clean.....	M	Oct. 3, 1938	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	10		Clean.....	M	Oct. 9, 1938	McDaniel pool, Margaree river, N.S.
(f)K285			Clean.....	F	Oct. 3, 1938	Margaree Salmon Fisheries Association net, Margaree Harbour, N.S.
	(z) (u) 6	29	Clean.....	F	1938	(e) Margaree Pond, N.S.

NICTAUX RIVER, N.S.

F6209	5 10½	26½ 31½	Kelt..... Clean.....	F F	Nov. 5, 1936 May 20, 1938	Nictaux Pond, N.S. Nictaux river, halfway from mouth and Rogers bridge, N.S.
F7034	6 11½	28½ 32	Kelt..... Kelt.....	F F	Nov. 9, 1936 Apr. 22, 1938	Nictaux Pond, N.S. Nictaux river, at Rogers bridge, N.S.
1001	7 7	29 30	Kelt..... Clean.....	M M	Nov. 15, 1937 June 7, 1938	Nictaux Pond, N.S. Bay of Fundy, ten miles off Point Lepreau, N.B.
1007	3 5½	25 25½	Kelt..... Clean.....	M M	Nov. 15, 1937 June 28, 1938	Nictaux Pond, N.S. Placentia Roads, Newfoundland.
1012	4	27	Kelt..... Kelt.....	F F	Nov. 16, 1937 Apr. 19, 1938	Nictaux Pond, N.S. Nictaux river, Stevens pool, N.S.
1059	7	31	Kelt..... Kelt.....	M M	Nov. 16, 1937 May 10, 1938	Nictaux Pond, N.S. Annapolis river, at Lawrence-town, N.S.
1063	6 7½	29½	Kelt..... Kelt.....	M M	Nov. 16, 1937 Apr. 19, 1938	Nictaux Pond, N.S. Nictaux river, at Rogers bridge, N.S.
1084	7 (aa) 6	31 32	Kelt..... Clean.....	F F	Nov. 17, 1937 July 8, 1938	Nictaux Pond, N.S. Garnish, Fortune bay, Newfoundland.

DEPARTMENT OF FISHERIES

TABLE No. 1—Continued

RECAPTURES, 1938—ATLANTIC SALMON—Continued

RIVER PHILIP, N.S.

Number	Weight (lbs.)	Length (ins.)	Condition	Sex	Date	1. Where liberated 2. Where caught
82	(d) 6½		Kelt.....		Oct. 13, 1937 Apr. 17, 1938	River Philip Pond, N.S. River Philip, at Oxford Junction, N.S.
F2567	17 (aa)25	37	Kelt..... Clean.....	F F	Nov. 10, 1936 1938	River Philip Pond, N.S. St. Anthony, Labrador.
F4869	7 18	29 32	Kelt..... Clean.....	F F	Nov. 12, 1936 July 10, 1938	River Philip Pond, N.S. One mile east of Coal point, Big Island, Pictou county, N.S.
F4883	15 (z) 21	37 41	Kelt..... Clean.....	F F	Nov. 12, 1936 1938	River Philip Pond, N.S. (c) River Philip Pond, N.S.

SACKVILLE RIVER, N.S.

F7042	4 14½	23 32	Kelt..... Clean.....	M M	Nov. 3, 1936 June 11, 1938	Sackville Pond, N.S. One and one-quarter miles south of Herring Cove Light House, Halifax county, N.S.
F7043	8 (z) (u) 10½	30½ 35	Kelt..... Clean.....	F F	Nov. 3 1936 1938	(b) Sackville Pond, N.S. Sackville Pond, N.S.
2047	3	23½	Kelt..... Kelt.....	F F	Nov. 8, 1937 May 5, 1938	Sackville Pond, N.S. Moirs Mill pond, at Bedford, N.S.
2116	3	23	Kelt..... Kelt.....	M M	Nov. 12, 1937 Apr. 30, 1938	Sackville Pond, N.S. Sackville river, near Sunnyside, N.S.
2141	7 (z) (u) 10	31½ 32½	Kelt..... Clean.....	M M	Nov. 19, 1937 1938	(b) Sackville Pond, N.S. Sackville Pond, N.S.

MIRAMICHI RIVER, N.B.

F1892	12	34	Kelt..... Kelt.....	F F	Oct. 28, 1937 May 28, 1938	Miramichi Pond, N.B. Miramichi river, one-quarter mile west of Nappan river, N.B.
F1895	10½	31	Kelt..... Kelt.....	M M	Oct. 28, 1937 May 22, 1938	Miramichi Pond, N.B. Southwest Miramichi river near Doaktown, N.B.
44	(d)	23	Kelt.....		Sept. 17, 1937 May 22, 1938	Miramichi Pond, N.B. Miramichi river, at Colgate camp at Big Hole, Curventon, N.B.
50	8 10	29½	Kelt..... Clean.....	F F	Oct. 24, 1937 Aug. 3, 1938	Miramichi Pond, N.B. Miramichi river, in Nappan bay, N.B.
101	8	30½	Kelt..... Kelt.....	F F	Oct. 27, 1937 May 21, 1938	Miramichi Pond, N.B. Northwest Miramichi river, at Exmoor, N.B.
108	8	30 30	Kelt..... Kelt.....	F F	Oct. 27, 1937 May 26, 1938	Miramichi Pond, N.B. Northwest Miramichi river, one- quarter mile above hatchery, South Esk, N.B.

TABLE No. 1—Continued

RECAPTURES, 1938—ATLANTIC SALMON—Continued

MIRAMICHI RIVER, N.B.—Continued

Number	Weight (lbs.)	Length (ins.)	Condition	Sex	Date	1. Where liberated 2. Where caught
502	9	30	Kelt.....	F	Oct. 30, 1937	Miramichi Pond, N.B.
		31	Kelt.....	F	May 27, 1938	Miramichi river, at Bartibog Bridge, N.B.
506	16	36	Kelt.....	F	Oct. 30, 1937	Miramichi Pond, N.B.
	19	37	Kelt.....	F	June 2, 1938	Miramichi river, at Derby Junction, N.E.
508	10	30	Kelt.....	F	Oct. 30, 1937	Miramichi Pond, N.B.
		31	Kelt.....	F	May 20, 1938	Miramichi river, at Chatham, N.B.
512	11	31½	Kelt.....	M	Nov. 1, 1937	Miramichi Pond, N.B.
		33½	Kelt.....	M	May 27, 1938	Miramichi river (north side) at Chatham, N.B.
518	8½	29	Kelt.....	F	Oct. 30, 1937	Miramichi Pond, N.B.
			Kelt.....	F	May 24, 1938	Northwest Miramichi river (south side), at Northwest Bridge, N.B.
541	9	28½	Kelt.....	F	Nov. 1, 1937	Miramichi Pond, N.B.
		29½	Kelt.....	F	May 25, 1938	Miramichi river, at Bartibog Bridge, N.B.
556	9½	28	Kelt.....	F	Nov. 1, 1937	Miramichi Pond, N.B.
			Kelt.....	F	May 19, 1938	Northwest Miramichi river, at Exmoor, N.B.
566	9	29½	Kelt.....	F	Nov. 1, 1937	Miramichi Pond, N.B.
			Kelt.....	F	May 9, 1938	Little Southwest Miramichi river, at Silliker, N.B.
567	17½	37½	Kelt.....	F	Nov. 1, 1937	Miramichi Pond, N.B.
			Kelt.....	F	May 21, 1938	Northwest Miramichi river, at Exmoor, N.B.
588	16	35½	Kelt.....	F	Nov. 1, 1937	Miramichi Pond, N.B.
			Kelt.....	F	May 22, 1938	Northwest Miramichi river, at Exmoor, N.B.
607	6½	23	Kelt.....	M	Nov. 2, 1937	Miramichi Pond, N.B.
		25	Clean.....	M	June 24, 1938	Black Duck Cove, St. Barbe district, Newfoundland.
629	10½	31½	Kelt.....	F	Nov. 2, 1937	Miramichi Pond, N.B.
			Kelt.....	F	May 14, 1938	Little Southwest Miramichi river, two miles above Red Bank, N.B.
643	9½	30	Kelt.....	F	Nov. 4, 1937	Miramichi Pond, N.B.
		30	Kelt.....	F	May 10, 1938	Northwest Miramichi river, N.B.
645	10	30½	Kelt.....	F	Nov. 4, 1937	Miramichi Pond, N.B.
		31	Kelt.....	F	May 25, 1938	Northwest Miramichi river, four miles above hatchery, South Esk, N.B.
648	9½	30½	Kelt.....	F	Nov. 4, 1937	Miramichi Pond, N.B.
			Kelt.....	F	May 25, 1938	Miramichi river, at Loggieville, N.B.
651	8½	29½	Kelt.....	F	Nov. 5, 1937	Miramichi Pond, N.B.
			Kelt.....	F	Apr. 27, 1938	Northwest Miramichi river, N.B.
661	16	38	Kelt.....	F	Nov. 5, 1937	Miramichi Pond, N.B.
		39	Kelt.....	F	May 24, 1938	Miramichi river, off West Point, near Loggieville, N.B.

TABLE NO. 1—*Continued*
 RECAPTURES, 1938—ATLANTIC SALMON—*Continued*
 MIRAMICHI RIVER, N.B.—*Continued*

Number	Weight (lbs.)	Length (ins.)	Condition	Sex	Date	1. Where liberated 2. Where caught
667	9½	30	Kelt..... Kelt.....	F F	Nov. 5, 1937 May 10, 1938	Miramichi Pond, N.B. Northwest Miramichi river, N.B.
673	9	29½	Kelt..... Kelt.....	F F	Nov. 5, 1937 May 23, 1938	Miramichi Pond, N.B. Little Southwest Miramichi river, three-quarter mile above Red Bank bridge, N.B.
688	17½	38	Kelt..... Kelt.....	F F	Nov. 5, 1937 June 1, 1938	Miramichi Pond, N.B. Northwest Miramichi river, at South Esk, N.B.
697	9	30	Kelt..... Kelt.....	F F	Nov. 5, 1937 May 23, 1938	Miramichi Pond, N.B. Northwest Miramichi river, at South Esk, N.B.
699	16½	38	Kelt..... Kelt.....	F F	Nov. 5, 1937 May 24, 1938	Miramichi Pond, N.B. Miramichi river, at Bartibog bridge, N.B.
731	12	32	Kelt..... Kelt.....	M M	Nov. 8, 1937 Apr. 27, 1938	Miramichi Pond, N.B. Little Southwest Miramichi river, at Lyttleton, N.B.
785	11	31½	Kelt..... Kelt.....	M M	Nov. 6, 1937 May 27, 1938	Miramichi Pond, N.B. Northwest Miramichi river, at South Esk, N.B.
797	10	29½ 29¾	Kelt..... Kelt.....	M M	Nov. 6, 1937 May 25, 1938	Miramichi Pond, N.B. Miramichi river, near mouth of Nappan river, N.B.
817	11	31½	Kelt..... Kelt.....	M M	Nov. 6, 1937 May 20, 1938	Miramichi Pond, N.B. Northwest Miramichi river, one- quarter mile above hatchery, South Esk, N.B.
821	13	33½	Kelt..... Kelt.....	M M	Nov. 6, 1937 May 15, 1938	Miramichi Pond, N.B. Northwest Miramichi river, one mile from mouth of Millstream, N.B.
870	12½	32½	Kelt..... Kelt.....	M M	Nov. 5, 1937 May 9, 1938	Miramichi Pond, N.B. Southwest Miramichi river, at Renous bridge, N.B.
879	13½	32	Kelt..... Kelt.....	M M	Nov. 5, 1937 May 25, 1938	Miramichi Pond, N.B. Miramichi river, at Lower New- castle, N.B.
898	8½	29	Kelt..... Kelt.....	F F	Nov. 5, 1937 June 2, 1938	Miramichi Pond, N.B. Miramichi river, at Loggieville, N.B.
900	18	38½	Kelt..... Kelt.....	F F	Nov. 5, 1937 May 23, 1938	Miramichi Pond, N.B. Northwest Miramichi river, at Exmoor, N.B.
904	11	30½	Kelt..... Kelt.....	F F	Oct. 30, 1937 May 27, 1938	Miramichi Pond, N.B. Northwest Miramichi river, at Cassilis, N.B.
919	17	36½	Kelt..... Clean.....	F F	Oct. 29, 1937 Aug. 29, 1938	Miramichi Pond, N.B. Miramichi river, one mile below Loggieville wharf, N.B.
935	8½	29	Kelt..... Kelt.....	F F	Oct. 29, 1937 May 27, 1938	Miramichi Pond, N.B. Northwest Miramichi river, one and one-half mile above hatch- ery, South Esk, N.B.

TABLE NO. 1—*Concluded*
 RECAPTURES, 1938—ATLANTIC SALMON—*Concluded*
 MIRAMICHI RIVER, N.B.—*Concluded*

Number	Weight (lbs.)	Length (ins.)	Condition	Sex	Date	1. Where liberated 2. Where caught
963	8½	30	Kelt..... Kelt.....	F F	Oct. 29, 1937 May 25, 1938	Miramichi Pond, N.B. Northwest Miramichi river, one quarter mile above hatchery, South Esk., N.B.
969	9	29	Kelt..... Kelt.....	F F	Oct. 29, 1937 May 3, 1938	Miramichi Pond, N.B. Little Southwest Miramichi river, at Silliker, N.B.
988	16 20½	35 39	Kelt..... Clean.....	F F	Oct. 29, 1937 Oct. 13, 1938	Miramichi Pond, N.B. Cain river, N.B.
992	8½	29	Kelt..... Kelt.....	F F	Oct. 29, 1937 May 25, 1938	Miramichi Pond, N.B. Miramichi river, at Loggieville, N.B.
993	15	35½	Kelt..... Kelt.....	F F	Oct. 29, 1937 May 27, 1938	Miramichi Pond, N.B. Miramichi river, at Oyster river, N.B.
996	10½	31	Kelt..... Kelt.....	F F	Oct. 29, 1937 May 23, 1938	Miramichi Pond, N.B. Miramichi river, below Oyster river, N.B.

NEW MILLS POND, N.B.

99	7½	30	Kelt..... Kelt.....	F F	Oct. 29, 1937 May 19, 1938	New Mills Pond, N.B. Restigouche river, at Flatlands, N.B.
1156	11½	34	Kelt..... Kelt	M M	Oct. 30, 1937 May 23, 1938	New Mills Pond, N.B. Bay Chaleur, at Point la Nim, N.B.
1166	7½ (v) 8	31	Kelt..... Kelt.....	F F	Oct. 30, 1937 Apr. 29, 1938	New Mills Pond, N.B. Nipisiguit river, one mile from mouth, N.B.
1175	11 11½	34	Kelt..... Kelt.....	M M	Oct. 30, 1937 May 31, 1938	New Mills Pond, N.B. Bay Chaleur, at Miguasha West, Que.
1177	9½	32	Kelt..... Kelt.....	M M	Oct. 30, 1937 May 25, 1938	New Mills Pond, N.B. Bay Chaleur, at Miguasha West, Que.
1200	11½	34	Kelt..... Kelt.....	M M	Nov. 2, 1937 May 27, 1938	New Mills Pond, N.B. McLeod Siding, N.B.

(aa) Weight when dressed.

(a) Caught for second time for fish cultural purposes, Sept. 19-Oct. 19, 1938.

(b) Caught for second time for fish cultural purposes, Sept. 1-Oct. 10, 1938.

(c) Caught for second time for fish cultural purposes, Sept. 21-Nov. 1, 1938.

(d) Tagged and liberated without weighing or measuring.

(e) Salmon caught tagged and liberated above the Margaree Salmon Fisheries Association net October 3 and 4; recaptured and placed in the Margaree salmon pond prior to October 19, 1938.

(f) Salmon tagged and liberated in Margaree river immediately above the Margaree Salmon Fisheries Association net.

(u) Liberated with same tag attached.

(v) Weight estimated.

(z) Weight after stripped.

TABLE No. 2

STATEMENT OF ATLANTIC SALMON TAGGED (TAGS ATTACHED TO DORSAL FIN) AT THE SEVERAL POINTS EACH YEAR, FROM 1913 TO 1938, INCLUSIVE, THE NUMBER OF RECAPTURES OF CLEAN FISH OF EACH SEASON'S TAGGING AT THE SEVERAL POINTS THAT HAVE BEEN REPORTED AND THE APPROXIMATE PERIOD THAT ELAPSED BETWEEN TAGGING AND RECAPTURE.

Place where tagging was done	Year	Number of Tags attached	Year after tagging during which clean fish were recaptured				
			First year	Second year	Third year	Fourth year	Fifth year
Allen's lake, N.S.....	1929	21	0	0	0	0	0
	1930	218	2	0	0	0	0
	1925	(Spring) 25	3	0	0	0	0
Port Maitland, N.S.....		264	5	0	0	0	0
	1913	98	5	(b) 8	0	0	0
	1914	150	(a) 2	2	0	0	0
Margaree pond, N.S.....	1915	119	0	1	0	0	0
	1916	200	1	5	0	0	0
	1917	99	0	7	0	0	0
	1918	99	0	(b) 6	0	0	0
	1919	84	0	1	2	0	0
	1920	105	3	5	0	0	0
	1921	(Spring) 18	(f) 1	0	0	0	0
	1921	(Fall) 103	0	(b) 2	0	0	1
	1922	(Spring) 30	1	0	0	0	0
	1922	(Fall) 98	0	1	0	0	0
	1923	(Spring) 20	1	0	0	0	0
	1923	(Fall) 99	0	(b) 2	0	0	0
	1924	99	0	(b) 7	0	0	0
	1925	0	0	0	0	0	0
	1926	0	0	0	0	0	0
	1927	0	0	0	0	0	0
	1928	100	0	1	0	0	0
	1929	0	0	0	0	0	0
	1930	486	(a) 4	(g) 32	0	0	0
	1931	0	0	0	0	0	0
	1932	0	0	0	0	0	0
	1933	166	1	6	0	0	0
	1934	536	(a) 6	(b) 24	(h) 1	0	0
	1935	641	(a) 8	(b) 12	0	0	0
	1936	193	0	(b) 8	0	0	0
	1937	33	0	0	0	0	0
	1938	200	11	0	0	0	0
		3,776	44	130	3	0	1
Nietaux pond, N.S.....	1931	261	4	(m) 5	0	0	0
	1932	165	4	(m) 4	0	0	0
	1933	140	0	(n) 9	1	0	0
	1934	76	2	0	0	0	0
	1935	0	0	0	0	0	0
	1936	92	1	1	0	0	0
	1937	124	3	0	0	0	0
	1938	37	0	0	0	0	0
		895	14	19	1	0	0
River Philip and Wallace river, N.S.	1924	198	0	0	0	0	0
River Philip pond, N.S.....	1929	247	1	(p) 5	0	0	0
	1930	293	1	1	0	0	0
	1931	0	0	0	0	0	0
	1932	0	0	0	0	0	0
	1933	0	0	0	0	0	0
	1934	0	0	0	0	0	0
	1935	0	0	0	0	0	0
	1936	200	0	(p) 3	0	0	0
	1937	44	0	0	0	0	0
	1938	500	0	0	0	0	0
		1,482	2	9	0	0	0

TABLE No. 2—Continued

Place where tagging was done	Year	Number of Tags attached	Year after tagging during which clean fish were recaptured				
			First year	Second year	Third year	Fourth year	Fifth year
Sackville pond, N.S.....	1932	97	(j) 3	2	0	0	0
	1933	150	(j) 4	(k) 7	0	1	0
	1934	54	1	0	0	0	0
	1935	0	0	0	0	0	0
	1936	97	(j) 6	(k) 2	0	0	0
	1937	239	(j) 1	0	0	0	0
	1938	0	0	0	0	0	0
		637	15	11	0	1	0
Miramichi pond, N.B.....	1913	250	0	3	0	3	0
	1914	97	1	(c) 3	0	0	0
	1915	119	1	(c) 3	0	0	0
	1916	297	0	(c) 1	0	0	0
	1917	149	0	(c) 1	0	0	0
	1918	149	0	(c) 4	0	0	0
	1919	100	0	0	0	0	0
	1920	188	1	(c) 1	0	0	0
	1921	161	0	0	0	0	0
	1922	149	0	(c) 4	0	0	0
	1923	150	0	0	0	0	0
	1924	195	(q) 1	2	0	0	0
	1925	0	0	0	0	0	0
	1926	0	0	0	0	0	0
	1927	0	0	0	0	0	0
	1928	100	0	0	0	0	0
	1929	0	0	0	0	0	0
	1930	0	0	0	0	0	0
	1931	0	0	0	0	0	0
	1932	0	0	0	0	0	0
	1933	0	0	0	0	0	0
	1934	0	0	0	0	0	0
	1935	0	0	0	0	0	0
	1936	0	0	0	0	0	0
	1937	617	4	0	0	0	0
	1938	0	0	0	0	0	0
	1927	(Spring) 20	0	0	0	0	0
		2,741	8	22	0	3	0
Tabusintac river, N.B.....	1928	(Spring) 17	0	0	0	0	0
	1928	(Fall) 8	0	0	0	0	0
	1929	(Spring) 2	0	0	0	0	0
	1930	(Spring) 5	0	0	0	0	0
		32	0	0	0	0	0
Restigouche and Upsalquitch rivers, N.B.	1921	(Spring) 228	2	0	0	0	0
Kedgwick river, N.B.....	1919	172	0	5	0	0	0
Little Main river, N.B.....	1920	19	0	1	0	0	0
Matapedia river, N.B.....	1927	100	1	1	0	0	0
	1928	100	0	0	0	0	0
	1929	0	0	0	0	0	0
	1930	100	0	1	0	0	0
		719	3	8	0	0	0
Tide Head pond (Restigouche), N.B..	1913	49	0	1	0	0	0
	1914	24	0	0	0	0	0
New Mills pond, N.B.....	1914	76	0	0	0	0	0
	1915	67	0	3	0	0	0
	1916	100	0	1	0	0	0
	1917	50	0	1	0	0	0
	1918	0	0	0	0	0	0
	1919	98	0	2	0	0	0
	1920	0	0	0	0	0	0
	1921	100	0	0	0	0	0
	1922	99	0	0	0	0	0
	1923	100	0	2	0	0	0
	1924	99	0	1	0	0	0
	1925	0	0	0	0	0	0
	1926	0	0	0	0	0	0

TABLE No. 2—Continued

Place where tagging was done	Year	Number of Tags attached	Year after tagging during which clean fish were recaptured				
			First year	Second year	Third year	Fourth year	Fifth year
	1927	0	0	0	0	0	0
	1928	0	0	0	0	0	0
	1929	0	0	0	0	0	0
	1930	409	1	5	0	0	0
	1931	0	0	0	0	0	0
	1932	0	0	0	0	0	0
	1933	0	0	0	0	0	0
	1934	0	0	0	0	0	0
	1935	0	0	0	0	0	0
	1936	0	0	0	0	0	0
	1937	169	0	0	0	0	0
	1938	0	0	0	0	0	0
		1,440	1	16	0	0	0
Nipisiguit river, N.B.	1924	231	1	(r) 2	0	0	0
	1925	169	1	3	0	0	0
	1926	118	0	1	0	0	0
	1927	64	0	0	0	0	0
		582	2	6	0	0	0
Saint John pond, N.B.	1913	50	0	1	0	0	0
	1914	100	0	2	0	0	0
	1915	70	(d) 2	1	0	0	0
	1916	196	0	5	0	0	0
	1917	100	0	1	0	0	0
	1918	100	0	0	0	0	0
	1919	100	1	0	0	0	0
	1920	96	0	1	0	0	0
	1921	104	0	0	0	0	0
	1922	99	1	0	0	0	0
	1923	100	1	1	0	0	0
	1924	100	0	1	0	0	0
	1925	0	0	0	0	0	0
	1926	0	0	0	0	0	0
	1927	0	0	0	0	0	0
	1928	0	0	0	0	0	0
	1929	0	0	0	0	0	0
	1930	806	5	13	0	0	0
	1931	0	0	0	0	0	0
	1932	0	0	0	0	0	0
	1933	0	0	0	0	0	0
	1934	2	0	0	0	0	0
	1935	0	0	0	0	0	0
	1936	0	0	0	0	0	0
	1937	20	0	0	0	0	0
	1938	658	0	0	0	0	0
		2,701	10	26	0	0	0
Morell river, P.E.I.	1918	44	0	0	0	0	0
	1919	48	0	1	0	0	0
	1920	0	0	0	0	0	0
	1921	49	(s) 1	0	0	0	0
	1922	78	0	0	0	0	0
	1923	48	0	1	0	0	0
	1924	39	0	0	0	0	0
	1925	0	0	0	0	0	0
	1926	0	0	0	0	0	0
	1927	0	0	0	0	0	0
	1928	0	0	0	0	0	0
	1929	137	(t) 5	1	0	0	0
	1930	273	(t) 2	(v) 10	0	0	0
	1931	0	0	0	0	0	0
	1932	0	0	0	0	0	0
	1933	0	0	0	0	0	0
	1934	0	0	0	0	0	0
	1935	0	0	0	0	0	0
	1936	0	0	0	0	0	0
	1937	34	0	0	0	0	0
	1938	0	0	0	0	0	0
		750	8	13	0	0	0

TABLE No. 2—Concluded

Place where tagging was done	Year	Number of Tags attached	Year after tagging during which clean fish were recaptured				
			First year	Second year	Third year	Fourth year	Fifth year
Tadoussac pond, Que.....	1913	37	0	0	0	0	0
	1914	99	0	3	0	0	0
	1915	69	6	0	0	0	0
	1916	98	0	1	0	0	0
	1917	60	0	3	0	0	0
	1918	0	0	0	0	0	0
	1919	50	0	0	0	0	0
	1920	126	0	0	0	0	0
	1921	102	1	1	0	0	0
		641	7	8	0	0	0
York pond, Que.....	1917	25	0	(e) 1	0	0	0
	1918	50	0	0	0	0	0
	1919	150	0	1	0	0	0
York river, Que.....	1921	100	0	0	0	0	0
		325	0	2	0	0	0
Allen's lake and Port Maitland, N.S.....		264	5	0	0	0	0
Margaree pond, N.S.....		3,776	44	130	3	0	1
Nictaux pond, N.S.....		895	14	19	1	0	0
River Philip, Wallace river and River Philip pond, N.S.....		1,482	2	9	0	0	0
Sackville pond, N.S.....		637	15	11	0	1	0
Miramichi pond and Cains river, N.B.....		2,741	8	22	0	3	0
Tabusintac river, N.B.....		32	0	0	0	0	0
Restigouche, Upsalquitch, Kedgwick, Little Main and Matapedia rivers, N.B.....		719	3	8	0	0	0
Tide Head and New Mills ponds, N.B.....		1,440	1	16	0	0	0
Nipisiguit river, N.B.....		582	2	6	0	0	0
Saint John pond, N.B.....		2,701	10	26	0	0	0
Morell river, P.E.I.....		750	8	13	0	0	0
Tadoussac pond, Que.....		641	7	8	0	0	0
York pond and river, Que.....		325	0	2	0	0	0
		16,985	119	270	4	4	1

Total clean recaptures.....398

- (a) Five of these were stripped and liberated at pond the second time, viz., one, 1914 and 1915; one, 1930 and 1931; two, 1934 and 1935, and one, 1935 and 1936.
- (b) Thirteen of these were stripped and liberated at pond the second time, viz., one, 1913 and 1915; two, 1918 and 1920; one, 1921 and 1923; one, 1923 and 1925; one, 1924 and 1926; three, 1934 and 1936; two, 1935 and 1937, and two, 1936 and 1938.
- (c) Twelve of these were stripped and liberated at pond the second time, viz., one, 1914 and 1916; one, 1915 and 1917; one, 1916 and 1918; one, 1917 and 1919; four, 1918 and 1920; one, 1920 and 1922, and three, 1922 and 1924.
- (d) One of these was stripped and liberated at pond the second time, viz., 1915 and 1916.
- (e) Stripped and liberated at pond the second time, viz., 1917 and 1919.
- (f) Tagged in spring 1921 and captured in net operated in Margaree river, stripped and liberated at pond, fall 1922.
- (g) Four of these were caught the second time for fish cultural purposes, viz., 1930 and 1932.
- (h) Stripped and liberated at pond the second time, viz., 1934 and 1937.
- (j) Eight of these were stripped and liberated at pond the second time, viz., one, 1932 and 1933; two, 1933 and 1934; four, 1936 and 1937, and one, 1937 and 1938.
- (k) Five of these were stripped and liberated at pond the second time, viz., four, 1933 and 1935, and one, 1936 and 1938.
- (m) Two of these were stripped and liberated at pond the second time, viz., one, 1931 and 1933, and one, 1932 and 1934.
- (n) Eight of these were caught the second time for fish cultural purposes, viz., 1933 and 1935. One died in pond and others lost their tags during summer.
- (p) Five of these were stripped and liberated at pond the second time, viz., four, 1929 and 1931, and one, 1936 and 1938.
- (q) Stripped and liberated at pond the second time, viz., 1924 and 1925.
- (r) One of these was stripped and liberated at pond the second time, viz., 1924 and 1926.
- (s) Stripped and liberated at Morell pond, 1921, and caught at Margaree pond, stripped and liberated, fall 1922.
- (t) Three of these were stripped and liberated at pond the second time, viz., two, 1929 and 1930, and one, 1930 and 1931.
- (v) One of these was stripped and liberated at pond the second time, viz., 1930 and 1932.

The recapture of clean salmon (table No. 2) that had been reported to December 31, 1938, constitutes 2·34 per cent of the total number (almost entirely kelts) that were tagged and liberated. The percentage of recaptures of salmon that were tagged in the various districts varies considerably, ranging from nil from the Tabusintac river to 4·71 per cent from the Margaree river. The failure of returns from the Tabusintac may be partly due to the small number, 32, that were tagged there.

The respective percentages are as follows:—

	Per cent
Allen's lake and Port Maitland, N.S.....	1·89
Margaree river, N.S.....	4·71
Nictaux river, N.S.....	3·87
River Philip and Wallace river, N.S.....	·74
Sackville river, N.S.....	4·23
Miramichi and Cains rivers, N.B.....	1·20
Tabusintac river, N.B.....	nil
Restigouche river and tributaries and New Mills, N.B.....	1·29
Nipisiguit river, N.B.....	1·37
St. John river, N.B.....	1·33
Morell river, P.E.I.....	2·80
Saguenay river, Tadoussac, P.Q.....	2·34
York river, P.Q.....	0·61

The summary of all tagging, from 1913 to 1938 inclusive, with returns therefrom, shows that 119 fish—or 29·9 per cent of the total number recaptured—were taken within one year; 270 salmon, or 67·8 per cent, within the second year; and four, or one per cent, in the third year; four or one per cent in the fourth year, and one salmon, or ·3 per cent in the fifth year, after they were tagged and liberated. The fifth-year fish was from the Margaree river.

As is to be expected, only a few of the salmon tagged in 1937, and none of those tagged in 1938, were reported up to the end of 1938.

The recapture of Atlantic salmon tagged in connection with Canadian Fish Cultural Operations referred to above is analysed in "*Sea Movements of Canadian Atlantic Salmon Kelt*" (Huntsman, A. G., 1938).

The marking of fish by fin clipping has been extended to hatchery product generally as indicated by table No. 3.

TABLE No. 3—FISH MARKED BY FIN CLIPPING, 1933

	Number marked	Species	Age	Distributed	Nature of mark—Removal of
<i>Nova Scotia</i> — Antigonish hatchery.....	300	Speckled trout.....	Yearlings.....	Dec. 12—Coose Coffre lake.....	Adipose and right pectoral
	300	"	"	Dec. 12—Copper lake, Antigonish county.....	"
	250	"	"	Dec. 9—Dewar dam-Barney river.....	"
	200	"	"	Dec. 14—McDonald dam—East river.....	"
	150	"	"	Dec. 16—Mountain Meadow pond—West river.....	"
	173	"	"	Dec. 16—Stewart dam tributary to Little Harbour.....	"
	200	"	Two years..	Dec. 13—McLean or James river lake.....	"
	389	"	"	Dec. 9—South river.....	"
	300	"	"	Dec. 13—West river, Antigonish county.....	"
	200	"	"	Dec. 3—Brierly brook lake.....	"
	277	"	Three years..	Dec. 16—Stewart dam tributary to Little Harbour.....	"
	2,000	"	Fingerlings	Aug. 11—Gleason brook—Portapique river.....	Adipose and right ventral.
	2,000	"	"	July 30—Isaac lake.....	"
	2,000	"	"	Aug. 13—Macan river, south branch.....	"
	2,000	"	"	July 30—Newfound lake.....	"
	2,000	"	"	Aug. 16—River Philip.....	"
	2,000	"	"	Aug. 23—Simpson lake.....	"
Cobequid hatchery.....	2,000	"	"	Aug. 15—Tullie creek.....	"
	2,000	"	"	Aug. 22—Wallace river.....	"
	570	"	Wild.	Nov. 21—Hart lake.....	Right ventral
	10,000	Atlantic salmon.....	Fingerlings	Aug. 29—Grand river.....	Adipose and left pectoral
	1,000	Speckled trout.....	"	Aug. 25—Pottie lake (Madame island).....	"
	11,799	Atlantic salmon.....	"	Oct. 24, 25—Northeast Margaree river, Murray pool.....	Adipose and right pectoral
	200	Speckled trout.....	"	Dec. 23—Hatchery or Ingram brook.....	"
	682	"	Yearlings.....	Nov. 26—Lake O'Law.....	"
	197	"	Two years..	May 13—Lake O'Law.....	"
	100	"	"	Nov. 21—Lake O'Law.....	"
Lindloff hatchery.....	200	"	"	Nov. 26—Lake O'Law, upper.....	"
	516	"	Three years..	May 13, 14—Lake O'Law.....	"
	375	"	"	Dec. 13—Plaster pond.....	"
	140	"	"	Dec. 17—Lake O'Law.....	"
	160	"	Four years..	May 13, 14—Lake O'Law.....	"
	730	"	"	Nov. 21—Lake O'Law.....	"
	550	"	"	Dec. 16—Plaster pond.....	"
	680	"	Five years..	May 12—Lake O'Law.....	"
	7,000	Atlantic salmon.....	Fingerlings	Sept. 12—Gaspereau river.....	Adipose and left ventral
		"	"	Sept. 12—Gaspereau river.....	"
Middleton hatchery..... Nictau Falls rearin station.....	3,000	"	"	Apr. 12, 1937—Clyde river.....	Adipose and right ventral
	4,000	Atlantic salmon.....	Yearlings...	Apr. 20, 1937—Mersey river.....	"
	600	Speckled trout.....	"	Dec. 8—Gardener brook.....	"
	739	"	Two years..	Dec. 8—Gardener brook.....	"
		"	"		"
Yarmouth hatchery.....					

TABLE No. 3—FISH MARKED BY FIN CLIPPING, 1938—Continued

—	Number marked	Species	Age	Distributed	Nature of mark—Removal of
<i>New Brunswick— Florenceville hatchery</i>	500	"	Yearlings....	June 16—Brown lake.....	Adipose and left pectoral
	400	"	"	June 16—Hagerman brook-St. John river.....	"
	300	"	"	June 15—Hardwood brook-St. John river.....	"
	500	"	"	July 21—Kingsley brook-Nashwaaksis river.....	"
	600	"	"	July 26—Jimekith brook-Nashwaak river.....	"
	500	"	"	June 15—Pokioik river.....	"
	500	"	"	July 29—Tinkettle brook-Nashwaak river.....	"
	391	"	Three years....	June 14, July 18—Bull creek-St. John river.....	"
	250	"	"	June 9, 10—Cranberry lake.....	"
	240	"	"	June 21, 22—Cross creek-Nashwaak river.....	"
	600	"	"	June 18—Second Eel river lake.....	"
	360	"	"	June 3, 8, 11, 13—Nashwaak river.....	"
	180	"	"	June 4, 7, 17—Nashwaaksis river.....	"
	200	"	"	June 18—Shogomoc river.....	"
	200	"	Five years....	May 16, 18—Big Guisguik river.....	"
	200	"	"	May 16, 19—Little Guisguik river.....	"
	100	"	"	May 17—Gallivan brook-St. John river.....	"
	150	"	"	May 18—McLeary brook-Lakeville pond.....	"
	(a)	Atlantic salmon....	Fingerlings....	May 17, 19—River de Chute.....	Adipose and right pectoral
	7,000	"	"	Sept. 30—St. John river, at Kilburn ferry.....	"
	5,000	"	"	Sept. 30—St. John river, at lower Perth.....	"
	5,000	"	"	Sept. 30—Salmon river, at Boat Landing.....	"
	5,000	"	"	Sept. 19—Salmon river headwaters.....	"
	5,000	"	"	Sept. 28—Hayley brook-Tobique river.....	"
	5,000	"	"	Sept. 26—Tobique river, Millers bogam.....	"
	5,000	"	"	Sept. 29—Tobique river, at Plaster rock.....	"
	5,000	"	"	Sept. 27—Tobique river, Waters bogam.....	"
	5,000	"	"	Sept. 29—Private pond, Power creek, Mr. Zeno Martin.....	"
<i>Miramichi hatchery</i>	2,000	Speckled trout....	"	Aug. 11—Northwest, Miramichi river.....	Adipose and right ventral
	4,000	Atlantic salmon....	"	Aug. 13, 22—Southwest Miramichi river.....	"
	2,000	"	"	Aug. 23—Renous river-Southwest Miramichi river.....	"
	5,500	"	"	Sept. 30—Crooked creek.....	"
<i>St. John hatchery</i>	3,440	Rainbow trout....	Yearlings....	Oct. 3, 5—Crooked creek.....	Adipose and right ventral
	545	"	Two years....	Sept. 24—Chamcook lake.....	Anal
	719	"	Fingerlings....	Sept. 23—Chamcook lake.....	Adipose and left pectoral
	12,000	Sebago salmon....	"	Sept. 28—Chamcook lake.....	Adipose and right pectoral
	10,000	"	Two years....	July 18—Red Rock lake.....	Adipose and right ventral
	1,612	Quananiche.....	"	Dec. 7—Loch Lomond.....	"
	5,000	Speckled trout....	Fingerlings....	Dec. 7—Lily lake-Rockwood Park.....	"
	2,700	"	Yearlings....		"
	566	"	"		"
		"	"		"

Prince Edward Island— Kelly's Pond hatchery.....	1,000	"	"	Two years.....	Dec. 7—Loch Lomond.....	"
	267	"	"	"	Dec. 7—Lily lake-Rockwood Park.....	"
	9	"	"	Five years.....	Dec. 7—Lily lake-Rockwood Park.....	"
Total.....	24,316	"	"	Fingerlings.....	Aug. 22, 23—Vessey brook-Winter river.....	Adipose and left pectoral
	191,902					

(a) Restigouche stock.

The percentage of marked trout that have been reported from different districts varies greatly in relation to the number that were marked. In some districts the anglers and residents do not seem to be interested to a sufficient extent to go to the trouble of reporting the capture of marked fish to the department, or to the nearest fishery officer.

The numbers of marked fish reported from 1935 to 1938, inclusive, are as follows:—

RECAPTURES OF FISH WITH FINS MISSING

Where recaptured	Number	Species	Date	Distributed from	Fins missing
Lake Edward dam, tributary to Gardener brook.	20	Speckled trout	April 19, 1936	Yarmouth hatchery	Adipose and right ventral
Gardener brook	several	"	Spring, 1936	"	"
Whitehouse Mill—Salmon river	8	"	April 25, 1936	"	"
Hick's Falls—Carleton river	several	"	Spring, 1936	"	"
Lake Skinner	several	"	Spring, 1936	"	"
Chamcook lakes	40	Sebago salmon	Oct. 21-Nov. 13, 1936	St. John hatchery	Adipose and right pectoral
Kejimikwik lake	several	Speckled trout	April and May, 1937	Yarmouth hatchery	Adipose and right ventral
Beaver lake	36	(a)	April 1-May 31, 1937	St. John hatchery	Right pectoral
Ping Pong lake	21	(a)	"	"	"
Campbell lake—River John	24	"	Angling season, 1937	Antigonish hatchery	Adipose and right pectoral
Cocoe's Cofre lake	458	"	"	"	"
Copper lake	87	"	"	"	"
Donahue lake	178	"	"	"	"
James River lake or McLean lake	228	"	"	"	"
Long lake—East River St. Mary	31	"	"	"	"
Sherbrook lake	231	"	"	"	"
Simon lake	23	"	"	"	"
South River lake	32	"	"	"	"
Stewart dam on tributary to Little Harbour	113	"	"	"	"
West river	16	"	"	"	"
Antigonish Harbour	6	"	"	"	"
Chamcook lakes	26	Sebago salmon	Oct. 23-Nov. 1, 1937	St. John hatchery	Adipose and right ventral
Copper lake	198	Speckled trout	Angling season, 1938	Antigonish hatchery	Adipose
Cutler lake	400	"	"	"	"
Dobson lake	125	"	"	"	"
Donahue lake	224	"	"	"	"
Grant lake	36	"	"	"	"
James River lake or McLean lake	332	"	"	"	"
Long lake—East River St. Mary	46	"	"	"	"
Sherbrook lake	187	"	"	"	"
Simon lake	150	"	"	"	"
South River lake	37	"	"	"	"
Stewart dam on tributary to Little Harbour	700	"	"	"	"
Trout lake	40	"	"	"	"
Grand lake	22	Sebago salmon	May-Sept., 1938	Grand Lake ponds	Adipose and right ventral
Hart lake	18	Speckled trout	Oct. 19-Nov. 11, 1938	Cobequid hatchery	Adipose
Chamcook lakes	1	Sebago salmon	June 3, 1938	St. John hatchery	Adipose and right pectoral
Chamcook lakes	65	"	Oct. 25-Nov. 16, 1938	"	"
Chamcook lakes	2	"	Oct. 25, 26, 1938	"	Adipose and right ventral
Ping Pong lake	1	(a) Speckled trout	May 30, 1938	"	Right pectoral

(a) Wild stock from Rairdon brook.

The 20 speckled trout listed under lake Edward were caught on April 19, 1936, in Gardener brook, one mile upstream from the point of liberation, five days later. The eight caught at Whitehouse Mill, Salmon river, were distributed in lake Ellenwood and were caught three miles upstream from the point of distribution within a period of 10 days. Those caught in Hick's falls, Carleton river, were distributed in lake Skinner in November, 1935, and had travelled downstream from ten to twelve miles before they were taken the following spring. Lake Skinner has no outlet which these fish could ascend and this condition may explain their movement downstream, which is the reverse of most recaptures.

With the exception of the sebago salmon caught on June 3, 1938, all the others listed were taken during egg collecting operations at the Chamcook lakes. Three more marked seabagos were reported by anglers, and the supervisor of fisheries for the district also reports that angling conditions were reasonably satisfactory and about 90 per cent of the fish taken bore the hatchery marks.

The Kejimikujik trout had travelled considerable distance from the point of liberation, crossed the lake, descended the Mersey river and were taken in the latter's tributaries.

The recaptures at Beaver and Ping Pong lakes afford additional proof that stunted races of speckled trout attain normal growth if they are transferred to a more suitable habitat where normal quantities of natural food are available.

The trout planted in these lakes came originally from Rairdon brook where they averaged 0.8 ounce in weight and five inches in length. They were retained and fed at St. John hatchery for a year, increasing in weight to 3.7 ounces and in length to $9\frac{1}{4}$ inches. They were then marked and distributed in Beaver and Ping Pong lakes. The 36 recaptures in 1937 in Beaver lake showed a good growth ranging up to 11 inches in length. Two had descended to Mispic river and were taken $2\frac{1}{2}$ miles from point of liberation. Others were taken in the lake $1\frac{1}{4}$ miles from point of liberation so that the maximum range of spread was $3\frac{3}{4}$ miles. The 21 recaptured in 1937 in Ping Pong lake ranged up to 12 inches in length and the largest was three-quarters of a pound in weight. One taken in 1938 weighed $15\frac{1}{2}$ ounces. This lake has no outlet and the fish are evenly distributed over its entire area.

The recaptures of marked trout reported from the Antigonish area up to the close of the angling season in 1938 represents 16.5 per cent of the number marked and distributed from that hatchery from 1935 to 1937 inclusive. The respective percentage recaptures of the marked fish distributed in the several lakes and streams in this district varies considerably, as shown in the following summary:—

Water	Number marked fish distributed	Number recaptured	Percentage recaptured
Campbell lake—River John.....	900	24	2.7
Cooee Coffre lake.....	1,000	458	45.8
Copper lake.....	900	285	31.7
Cutler lake.....	500	400	80.0
Dobson lake.....	468	125	26.7
Donahue lake.....	1,500	402	26.8
Grant lake.....	200	36	18.0
James River lake or McLean lake.....	1,000	560	56.0
Long lake—East river St. Mary.....	3,504	77	2.2
Sherbrook lake.....	1,700	418	24.6
Simon lake.....	690	173	25.1
South River lake.....	1,816	69	3.8
Stewart dam on tributary to Little harbour.....	1,625	813	50.0
Trout lake.....	200	40	20.0
West river.....	2,800	22	.8

Of the Cooee Coffre lake group caught in 1937 seventy-six were taken in Sand lake, 87 in Pan Handle lake, 16 in Cole Harbour river and the balance in the lake where they were distributed.

Of the Sherbrook Lake group caught during the angling season of 1937, twenty-five were taken in the lake outlet, one in St. Mary's river and a number in Thud lake, three miles above Sherbrook lake. Those caught in 1938 were taken in the lake and in the outlet stream.

From those caught during the angling season of 1938 in the Dobson Lake group nineteen were taken one mile below the lake; in the Donahue Lake group twelve were taken one-quarter mile below the lake; in the McLean Lake group fourteen were taken below McLean lake; and in the Trout Lake group twenty were taken one-quarter to one-half mile below Trout lake—the balance in all cases being taken in the lakes where they were planted.

The eighteen marked trout from Hart lake were taken during egg-collecting operations and had been marked during a similar operation the previous year. The percentage recaptured in this instance was quite small, but angling had been carried on rather extensively during the intervening year.

The first distribution of marked Atlantic salmon from the Florenceville hatchery was made in 1935. These were from the spawning of 1933. Two salmon were reported with fins missing in June and July, 1938. The examination of the scales showed two years of parr life and two years in the sea.

NOVE SCOTIA
ANTIGONISH HATCHERY

	Atlantic salmon			Rainbow trout		Speckled trout			
	Advanced fry	Fingerlings		Fingerlings No. 2	Year-lings	Fingerlings			
		No. 1	No. 2			No. 1	No. 2	No. 3	No. 4
Antigonish Co.—									
Beaver Meadow river...						70,000			
Brierly brook...						20,000			
Brierly brook lake...									
Copper lake...						30,000			
Glenroy river...						80,000		300	
James river...	40,000	25,000							
Maryvale brook...						15,000			
Meadow Green river...						75,000			
McLean lake or James river lake...									
North lake...						25,000			200
Polson brook—South river...						25,000			
Rights river...	40,000	25,000				25,000			
South river...			9,304						
South lake...						55,000			
Springfield brook—Glenroy river...						25,000			
West river...								5,000	
Guysborough Co.—						115,000	25,000		300
Cole Harbour lake...						25,000	3,606		
Cooce Coffre lake...						40,000			
Country Harbour river...	80,000	70,000						300	
Cutler lake...							20,000		
Dobson lake...						15,000	3,500		
Donahue lake...						40,000			
Doyle lake...						10,000			
Eight Island lake...						10,000			
Ecum Secum river...						39,000			
Fitzgerald lake...						10,000			
Goldboro lake...						10,000			
Guysborough river...		30,000				35,000	25,000		
Hazel Hill lake...						45,000			
Indian Harbour lake...						39,000			
Jellow lake...						40,000		4,000	
Lawlor lake...									
Long lake—Salmon river...						20,000			
Long lake—East river St. Mary...									1,700
Narrow lake...						10,000			

ANTIGONISH HATCHERY—Concluded

	Atlantic salmon			Rainbow trout		Speckled trout						
	Advanced fry	Fingerlings		Fingerlings No. 2	Yearlings	Fingerlings				Yearlings	Two years	Three years
		No. 1	No. 2			No. 1	No. 2	No. 3	No. 4			
Guyborough Co.—Concluded												
Nickerson lake.....						10,000						
East River St. Mary.....	125,000	250,000										
West River St. Mary.....	125,000	195,000	60,000			30,000	25,000					
Salmon river.....		100,000				10,000						
Seal Harbour lake.....						52,000						
Sherbrook lake.....						20,000						
Square lake.....												
Smelt lake.....				24,694	971							
Tracadie river.....		60,000										
Pictou Co.—												
Barney river.....	40,000	60,000				20,000						
Big brook—East river.....						50,000						
Brora lake.....						40,000						
Caldor lake.....						6,000						
Big Caribou river.....						18,000						
Little Caribou river.....						50,000						
Chisholm lake—East river.....						40,000			250			
Chisholm lake—West river St. Mary.....						10,000						
Dewar dam—Barney river.....		50,000										
East river.....		55,000				25,000	15,000					
French river.....												
French river, branch.....												
Fraser's or Horse pond—Little Harbour.....									300			
Little Harbour lake.....						50,000						
Maple lake.....						10,000						
McLellan brook.....						35,000						
McDonald dam—East river.....									200			
Middle river.....		20,000										
Mountain Meadow pond—West river.....										150		
Six Mile brook.....						42,000						
Stewart dam tributary to Little Harbour.....						20,000				173		277
West branch brook.....						90,000	50,000					
West river.....												
	450,000	980,000	69,304	24,694	971	1,576,000	167,106	9,000	2,000	1,373	1,473	672

Total distribution.....

3,282,593

BEDFORD HATCHERY

	Atlantic Salmon		Speckled trout	
	Advanced fry	Fingerlings No. 1	Advanced fry	Fingerlings No. 1
Experimental pond (Job's) Wittenberg.....				2,000
Colchester Co.—				
Otter brook.....				33,000
Pembroke river.....	45,000	42,000		
Stewiacke river, south branch.....				33,000
Halifax Co.—				
Big Salmon river.....		42,000		
Brown lake—Musquodoboit river.....				30,000
Chezzetcook river.....		21,000		
Conrod lake.....			33,000	
Governor brook—Nine Mile river.....		42,000		
Halfway river.....				33,000
Little Sheldrake lake.....			33,000	
McGrath lake.....				30,000
Moser river.....		42,000		
Musquodoboit river, upper.....		30,000		
Oyster ponds.....			33,000	
Upper Petpeswick—Long Bridge or Bridge End lake.....				33,000
Porter lake.....		20,000		
Quoddy river.....		21,000		
Sackville river.....		42,550		
Salmon river (Port Dufferin).....		30,000		
Ship Harbour lake.....		40,575		
Taylor brook.....		42,000		
Little West river—Sheet Harbour.....		21,000		
West River Sheet Harbour.....		42,000		
Hants Co.—				
Cameron lake.....				13,600
Coxcomb lake.....				33,000
Five Mile lake.....				30,000
Kennetcook river.....		40,000		
Lunenburg Co.—				
Corkum lake.....			33,000	
Gold river.....		133,000		
Middle river.....		84,000		
Mill lake—Canaan river.....				20,000
Mill lake—Hubbard river.....				30,000
Spectacle lake.....				33,000
Seffernsville lake.....			33,000	
Spondo lake brook.....			33,000	
	45,000	735,125	198,000	353,600

Total distribution..... 1,331,725

COBEQUID HATCHERY

	Atlantic salmon			Speckled trout		
	Fry	Advanced fry	Fingerlings No. 1	Fingerlings		
				No. 1	No. 2	No. 3
Westmorland Co.—						
Chapman pond brook.....					7,500	
Lac St. Emile.....					1,000	
Little Shemogue river.....					7,500	
Colchester Co.—						
Bass river, at Five Islands.....				15,000		
Debert river.....			100,000			
East river, at Five Islands.....				15,000		
Economy river.....		120,000	40,000			
Economy lake.....				15,000		
Folly river.....		60,000	40,000			
Folly lake.....				15,000		8,000
Gamble lake.....					10,000	
Little Gamble lake.....						3,000
Great Village river.....		60,000	40,000			
Hart lake.....					20,000	
Irving lake.....				10,000		
Long lake—French river.....				10,000		
McCallum lake.....				10,000		
Moose lake.....				5,000		
Newton lake.....				15,000		
North river, near Truro.....			110,000			
Portapique river.....		60,000	40,000			
Salmon river.....		60,000	105,000			
Shatter lake.....				10,000		
Silica lake or Bass River lake.....				15,000		
Simpson lake.....				30,000		4,000
Truro Reservoir, Leper brook.....					8,000	
Waugh's river.....				10,000		
Whirley Wha lake.....				10,000		
Cumberland Co.—						
Amherst Pumping Station pond.....				10,000		
Black river.....				15,000		
Blair lake.....					10,000	
Currie pond.....				10,000		
East river—Maccan river.....					10,000	
Fountain lake.....				25,000		
Fox river.....				5,000		
French river.....				20,000		
Gilbert lake.....				20,000		1,000
Gleason brook—Portapique river.....				10,000	2,000	
Halfway river lake.....				20,000		
Harrison lake.....					8,168	
Isaac lake.....				20,000	2,000	
Little lake—Newfound lake.....				5,000		
McAloney lake.....				15,000		1,000
Maccan river.....	60,000	50,000	20,000			
Maccan river, south branch.....				20,000	2,000	
Maccan river, west branch.....				20,000		
Mountain brook.....				10,000		
Newfound lake.....				20,000	2,000	
Parrsboro Aboiteau.....				15,000		1,000
Polly brook.....				5,000		
Pugwash river.....				20,000		
Ramshead river.....				5,000		
River Philip.....	60,000	135,000	303,600		8,000	
River Philip, east branch.....				15,000		1,783
River Philip, west branch.....				15,000		
Shinimikas river.....		100,000				
Sugarloaf brook.....				15,000		
Sutherland lake.....				10,000	7,000	
Tidnish river.....		40,000			10,000	
Tillie creek.....				5,000	5,000	
Vickery lake.....					10,000	
Wallace river.....	60,000	135,000	50,000	20,000		2,000
Wallace river, west branch.....				20,000		
Pictou Co.—						
River John.....				15,000		
	180,000	820,000	848,600	590,000	130,168	21,783

Total distribution..... 2,590,551

COLDBROOK REARING PONDS

Kings Co.—	Speckled trout	
	Fingerlings	No. 4
Annapolis river	5,000	
Aylesford lake	32,000	
Canard river	3,000	
Cornwallis river	5,500	
Gaspereau lake	15,000	
Habitant river	3,000	
Hardwood lake	5,000	
Kinsman brook	500	
Lake Paul	5,000	
Lake Torment	20,000	
Mack lake	2,000	
Murphy lake	5,000	
Nimchin Page lake	3,000	
Parker brook	500	
Thomas Clark brook	500	
Trout river	3,000	
	108,000	
Total distribution	108,000	

GRAND LAKE REARING PONDS

	Atlantic salmon	
	Fingerlings No. 3	Yearlings
Halifax Co.—		
Big Salmon river.....	25,000	
Chezzetcook river.....	39,000	
Grand lake.....	9,624	
Ingram river.....	52,000	5,500
Musquodoboit river.....	13,000	
Nine Mile river.....	39,000	2,000
Partridge run-Echo lake.....	13,000	
Quoddy river.....	24,000	
Sackville river.....	26,000	6,807
Salmon river (Jeddore Harbour).....	12,000	
Salmon river (Port Dufferin).....	24,000	1,500
Ship Harbour river.....	12,000	3,500
Little West river-Sheet Harbour.....	24,000	
West river-Sheet Harbour.....	37,000	
Hants Co.—		
Kennetcook river.....	26,000	
Pembroke river.....	13,000	
Stewiacke river.....	13,000	
Lunenburg Co.—		
Gold river.....	39,000	4,000
Middle river.....	38,000	5,500
	478,624	28,807

Total distribution..... 507,431

KEJIMKUJIK REARING PONDS

	Atlantic salmon Fingerlings			Speckled trout Fingerlings	
	No. 1	No. 2	No. 3	No. 3	No. 4
Annapolis Co.—					
Cashman brook.....					3,000
Little river.....				3,000	9,000
Fairy lake.....					3,000
Maitland river.....					3,000
Mount Tom brook.....					6,000
Roger brook.....					6,000
West river.....					12,000
Queens Co.—					
Grafton lake.....					2,128
Kejimkujik lake.....					15,000
Medway river.....	20,000	33,000	42,000		
Menchan lake.....					4,000
Mill pond—Medway river.....					3,500
	20,000	33,000	42,000	3,000	66,628
Total distribution.....					164,628

LINDLOFF HATCHERY

	Atlantic salmon Fingerlings	Rainbow trout Fingerlings	Speckled trout Fingerlings	
	No. 2	No. 2	No. 2	No. 3
Cape Breton Co.—				
Enon lake (via Munroe lake).....		11,125		
Gaspereau river.....	55,470			
Lever lake.....		11,124		
Salmon river.....	162,838			
Richmond Co.—				
Black river.....			20,000	
Ferguson lake.....			20,000	
Grand river.....	200,898			
Grand lake (Madame island).....			30,000	
Mary Ann's lake.....			3,000	
McIsaac lake.....			20,000	
Pottie lake (Madame island).....				18,486
Saint Esprit lake.....			15,000	
Seaview lake.....			18,000	
Shaw lake (Madame island).....				15,000
Thompson lake.....			5,000	
Tillard river, east.....			20,000	
	419,206	22,249	151,000	33,486
Total distribution.....				625,941

MARGAREE HATCHERY

[illegible]

MARGAREE HATCHERY—Continued

	Atlantic salmon				Speckled trout					Two years	Three years	Four years	Five years		
	Ad- vanced fry	Fingerlings				Fingerlings								Year- lings	
		No. 1	No. 2	No. 3	No. 4	No. 1	No. 2	No. 3	No. 4						No. 5
Inverness Co.— <i>Concluded</i>															
Northeast Margaree river— <i>Concluded</i>															
Doyle's bridge.....	60,000									90,000					
Egypt brook.....												3,000			
Forest Glen brook.....				4,000						30,000		5,000			
Hart pool.....										20,000		5,200			
Hatchery or Ingram brook.....															
Ingraham bridge.....	80,000										102	274			
Island brooks.....	50,000														
Lake O'Law brook.....										91,211					
Lake O'Law.....										30,000		7,000			
Fortune brook.....										30,000		42,315			
McKinnon brook.....															
Lake O'Law, upper.....										77,289		10,000			
Levis brook.....		50,000										10,000			
McDaniel pool.....															
McDermid pool.....	100,000														
McDonald brook.....															
McLean pool.....				40,000						30,000					
McLeod brook.....															
Murphy brook.....										30,000					
Murray brook.....										17,167		3,000			
Murray pool.....										30,000		3,000			
Old bridge pool.....						30,000									
Rock pool.....						24,000									
Ross bridge.....	200,000					30,000									
Stewart brook.....						20,000									
Stewart brook, above.....						8,000									
Stewart brook, below.....						4,000									
Tingley crossing.....						8,000									
Ward's pool.....	100,000					8,000									
Watson brook.....		50,000		30,000											
McColl brook.....										15,000					
McDonnell brook—tributary to Mar- garee Harbour.....										10,000					
McPherson brook—River Denys.....															
Null river.....		75,000													
Plaster pond.....															
Plateau brook.....															
Skye brook.....										30,000					
Southwest Margaree river.....	100,000									20,000					
Captain Allan's brook.....															
McDonnell brook.....															
McFarland's bridge.....															
Matheson Glen brook.....	200,000									50,000					
Salt brook.....										50,000					
Strathlorne brook.....				20,000											

[illegible]

Total distribution.

4,978,131

MERSEY RIVER POND

Queens Co.—		
Mersey river	.....	34,100
Lower Great	.....	11,300
Upper Great	.....	19,200
Total distribution	.....	64,600

DEPARTMENT OF FISHERIES

MIDDLETON HATCHERY

	Atlantic salmon Fingerlings			Salmon trout		Speckled trout		
	No. 1	No. 2	No. 3	Advanced fry	Finger- lings No. 1	Fingerlings		
						No. 1	No. 2	No. 3
Annapolis Co.—								
Annie Morehouse lake							10,000	
Bailey lake								10,000
Bear river		20,000						
Beaver lake—Bear river							10,000	
Bogart lake								10,000
Crisp brook						5,000		
Elliott lake							10,000	
Fed lake								8,000
Foster lake								7,000
Gibson lake							10,000	
Lake Jolly							15,000	
Lamb brook								10,000
Lequille river		50,000						
Lily lake						6,000		3,000
Little river—Annapolis river								7,000
Long lake—Bear river								10,000
Long lake—North Mountain								10,000
Lower Sixty lake								10,000
McGill lake							15,000	10,000
Millford lake						25,000		
Millbury lake								5,000
Morton brook							10,000	
Nictaux river			1,350					10,000
North lake—Round Hill river								10,000
Paradise lake						10,000		
Parker brook						10,000		
Rumsey lake							15,000	
Round Hill river		45,000						
Sand lake								11,000
Sandy Bottom lake							15,000	
Shannon lake						20,000		
Simpson lake								10,000
Slocumb brook						5,000		
Todd lake								
Trout lake							10,000	
Walker lake							10,000	
Waterloo lake							10,000	
Young lake								12,000
Zwicker lake								5,000
Digby Co.—						10,000		
Barnes lake							10,000	
Mallett lake								10,000
Porter or Mistake lake							8,000	
Hants Co.—								
Avon river, south branch		20,000						
Falls lake stillwater							10,000	
Halfway river								6,275
Lebreau brook								5,000
Mockingbird lake								12,000
Murphy lake							10,000	
Panuke lake								15,000
Zwicker lake							10,000	
Kings Co.—								
Gaspereau river		15,000	7,000					
Lunenburg Co.—								
Butler lake							10,000	
Canoe lake, north								7,000
Canoe lake, south								7,000
Card lake						25,000		
Feener lake								7,000
Francy lake							10,000	
Gold river	50,000	45,000						
Holbert lake							10,000	
Indian lake							10,000	
LaHave river		50,000						
Lake William						20,000		
Lewis lake							10,000	
Middle river		45,000						
Petite river		45,000						
Sherbrooke lake				120,000	174,575			
Smith lake							8,000	
Vaughan lake								10,000
Wentzell lake								7,000
West lake							8,000	
Whetstone lake							15,000	
Whitney lake						10,000		
Wiles Stillwater—La Have river							8,000	
Queens Co.—								
Little Winford or Long lake—								
Medway river								10,000
Maligaek lake							15,000	
Medway river		90,000						
Morsey river, headwaters								20,000
	50,000	425,000	8,350	120,000	174,575	146,000	292,000	274,275

Total distribution.....1,490,200

NICTAUX FALLS REARING STATION

	Atlantic salmon			
	Advanced fry	Fingerlings		
		No. 1	No. 2	No. 3
Annapolis Co.—				
Annapolis river.....		50,000		20,000
Fales river.....			25,000	
Nictaux river.....		200,000	80,000	178,400
Hants Co.—				
Avon river, west branch.....			15,000	
Kings Co.—				
Cornwallis river.....		25,000		
Gaspereau river.....				3,000
Lunenburg Co.—				
LaHave river.....	80,000			
Queens Co.—				
Medway river.....			25,000	
	80,000	275,000	145,000	201,400

Total distribution..... 701,400

No.	—	Atlantic Salmon							Year- lings
		Fry	Advanced Fry	Fingerlings					
				No. 1	No. 2	No. 3	No. 4	No. 5	
1	Annapolis Co.— Whalen lake.....								
2	Digby Co.— Babine Meadows.....								
3	Bear river, west branch.....								
4	Belliveau Cove river.....								
5	Boar Back lake.....								
6	Carrying Road lake.....								
7	Dean brook.....								
8	Doucette brook.....								
9	Grosses Coques river.....								
10	Haines lake.....								
11	Harris lake.....								
12	Mallett lake.....								
13	Meadow brook—Carleton river.....								
14	Meteghan river, east branch.....								
15	Meteghan river, west branch.....								
16	Payson's Meadow.....								
17	Porter or Mistake lake.....								
18	Riviere a Margo-Meteghan river.....								
19	Salmon river.....	100,000	30,000	40,000			54,800		8,000
20	Salmon river, headwaters.....								
21	Seven Pence Ha Penny river.....								
22	Silver river.....								
23	Sissiboo river.....								
24	Sullivan Flowage.....								
25	Thibault lake.....								
26	Wentworth lake.....								
27	Kings Co.— Sunken lake.....								
28	Lunenburg Co.— Blystner lake.....								
29	Peener's brook.....					200			
30	Wall lake.....								
31	Wiles lake.....								
32	Queens Co.— Christopher brook.....								
33	Fifteen Mile brook.....								
34	Medway river.....			55,000			15,000	10,000	6,000
35	Medway river, headwaters.....								
36	Mersey river.....								5,000
37	Tupper lake.....								
38	Shelburne Co.— Baker's Flats pond.....								
39	Birchtown brook.....								
40	Clyde river.....		120,000		50,000		34,000		6,000
41	Deception brook.....								
42	East river.....								
43	Lake George.....								
44	Granite Village brook.....								
45	Pugg lake.....								
46	Tigney brook.....								
47	Yarmouth Co.— Argyle river.....								
48	Burrell brook.....								
49	Carleton river.....								
50	Coldstream river.....								
51	East branch—Tusket river.....								
52	Ellenwood lake.....								
53	Gardener brook.....								
54	Little river—Tusket river.....								
55	Big Meadow brook.....								
56	Mood brook—Salmon river.....								
57	Reynard bridge—Carleton river.....								
58	Salmon river.....		75,000	35,000			15,000		
59	Tedford lake.....								
60	Tusket river.....								
		100,000	225,000	130,000	50,000	200	118,800	10,000	25,000

HATCHERY

Rainbow Trout			Speckled Trout									No.
Fingerlings		Year- lings	Fry	Advanced Fry	Fingerlings				Year- lings	Two years	Three years	
No. 3	No. 4				No. 1	No. 3	No. 4	No. 5				
								5,000				1
			25,000					5,000				2
					25,000							3
				42,000								4
							3,000					5
			25,000		15,000							6
					25,000							7
							2,500					8
								2,600				9
							2,500					10
				20,000	7,000							11
			50,000					1,000				12
			50,000		20,000							13
												14
					20,000							15
							3,000					16
						10,000		1,700				17
					25,000							18
					35,000			3,000				19
					13,000			4,000				20
												21
						20,000		2,000				22
												23
												24
												25
												26
	5,000											27
												28
						200		4,000				29
200		2,500						4,000	60	30	8	30
												31
												32
								5,000				33
								6,000				34
									4,000			35
	7,500											36
												37
												38
								3,000				39
												40
								3,000				41
								2,000				42
								1,000				43
								2,000				44
	6,000	2,500										45
								2,000				46
												47
					30,000							48
			100,000		15,000							49
												50
					20,000		15,000		5,000			51
												52
												53
							15,000		8,600	739		54
					20,000							55
					15,000							56
							10,000					57
												58
				56,000								59
					50,000		3,750					60
200	18,500	5,000	250,000	118,000	315,000	73,950	32,000	43,300	17,660	769	8	

Total distribution..... 1,533,387

NEW BRUNSWICK
FLORENCEVILLE HATCHERY

	Atlantic salmon			Speckled trout				
	Fingerlings			Fingerlings			Year- lings	Three years
	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3		
New Brunswick Fish and Game Protective Association— Fredericton branch.....			500			250		
Carleton branch.....			500					
Carleton Co.—	135,000		34,442					
Becaguinec river.....								
Big Guisguet river.....								
Little Guisguet river.....								
Big Presquile river.....	75,000	36,000		30,000				200
Little Presquile river.....		24,000	20,000	30,000				200
Big Shiktahawk river.....	40,000		5,000					
Little Shiktahawk river.....			24,769					
Bogan brook-Southwest Miramichi river.....	10,000							
Bull creek-Saint John river.....				35,000	6,000			391
Burpee brook-Presquile river.....				6,000				
Carr lake.....				10,000				
Clearwater brook-Southwest Miramichi river.....	15,000							
Colton brook-Shiktahawk river.....								
Debec brook-Saint John river.....				5,000				
Dingee brook-Saint John river.....					6,000			
Elliott brook-Southwest Miramichi river.....	25,000			1,500				
Gallivan brook-Saint John river.....				7,000				100
Gibson creek, north branch-Saint John river.....					5,000			
Hagerman brook-Saint John river.....				15,000			400	
Hardwood brook-Saint John river.....				6,000			300	
McLeary brook-Lakeville pond.....				15,000				100
Mallory brook-Saint John river.....				10,000				
Maynes brook-Little Presquile river.....				15,000				
Medunkeag river.....	75,000	58,000	34,000					
Mile brook-Saint John river.....				1,000				
Southwest Miramichi river.....	75,000	24,000	70,000					
Southwest Miramichi river, north branch.....								
Southwest Miramichi river, south branch.....		60,000	36,000					
Monquart river.....	60,000		5,000					
Priest brook-Monquart river.....				5,000				
River de Chute.....				40,000				
Simpson brook-Southwest Miramichi river.....	10,000							150

GRAND FALLS HATCHERY

	Atlantic salmon				Speckled trout				
	Ad- vanced fry	Fingerlings			Fry	Ad- vanced fry	Fingerlings		
		No. 1	No. 2	No. 3			No. 1	No. 2	No. 3
Salmon river—Victoria Co.—									
Salmon river (over 10 miles).....		50,000							
Salmon river flats.....		30,000	20,000						
Salmon river, headwaters.....			15,000	84,000					
Salmon river, mouth of.....		20,000							
Salmon river, at Estey camp.....		15,000	55,000						
Salmon river, at Guimont lodge.....		18,000	40,000						
Salmon river, at Mignault lodge.....			20,000						
Salmon river, at Power's camp.....		18,000	60,000						
Aubin crossing.....		20,000	20,000						
Big bogan.....		18,000	20,000						
Boat Landing.....		35,000		18,681					
Cote Mill.....		15,000	60,000						
Covered bridge.....		18,000	40,000						
Cyr flats.....		15,000	45,000						
Danish Mill.....		15,000							
Davis Mill.....		15,000	20,000						
Iron bridge.....		25,000							
Little Salmon river.....		45,000	35,000						
Mersereau lake.....					5,000				
Outlet brook.....					5,000				
Sutherland brook.....						50,000			
Watson flats.....		25,000							
St. John river—Victoria Co.—									
Andover.....		20,000							
Andover bar.....		40,000							
Andover, lower.....		25,000							
Andover, upper.....		20,000							
Argosy.....		20,000	20,000						
Aroostock.....			25,000						
Aroostock bar.....		50,000							
Aroostock Junction.....		20,000							
Boutout brook.....						10,000			3,000
Cliffordvale.....		15,000							
Coronation.....		15,000							
Costigan point.....		30,000							
Dee point.....		25,000							
Four Falls brook.....							15,000		7,000
Gallagher flats.....		20,000	40,000						
Hatchery brook, above falls.....									4,486
Hitchcock flats.....		25,000	35,000						
Inman.....			15,000						
Inman brook.....									5,000
Inman flats.....		55,000							
Kilburn ferry.....	25,000		15,000	20,000					
Limestone.....		30,000							
Lower Basin.....		20,000	15,000						
McLaughlin flats.....		30,000							
Morrill.....		25,000	75,000	15,722					
Muniac river, mouth of.....	25,000		25,000						
Muniac, upper.....		40,000							
Ortonville.....		25,000	35,000						
Perth.....		25,000	25,000						
Perth, lower.....	25,000	50,000	35,000	20,000					
Perth, upper.....		20,000							
Pokiok brook.....								65,000	25,000
Sullivan flats.....		20,000							
Undine.....		5,000							
Watson flats.....		10,000							
Tobique river (over 10 miles).....		25,000							
Tobique river, mouth of.....		35,000							
Arthurette.....				15,000					
Arthurette bridge.....				20,000					
Bear brook.....					10,000				
Grear flats.....				20,000					
Haley brook.....				20,000					
Millers.....				20,000					
Millers bogan.....				20,000					
Plaster Rock.....				20,000					
Red Rapids.....			15,000	20,000					
Riley brook.....				35,000					
Two brooks.....				20,000					
Waters bogan.....				20,000					
Watson flats.....				20,000					

GRAND FALLS HATCHERY—Continued

	Atlantic salmon				Speckled trout				
	Ad- vanced fry	Fingerlings			Fry	Ad- vanced fry	Fingerlings		
		No. 1	No. 2	No. 3			No. 1	No. 2	No. 3
Madawaska Co.—									
Baker brook.....									
Baker lake.....								35,000	
Grand river.....								80,000	
Beaver brook.....								45,000	
Big Fork.....								10,000	
Black brook.....								25,000	
Harrison brook.....								15,000	
Mud brook.....								7,000	
Violette brook.....								10,000	
Yellow brook.....								12,000	
Green river.....								11,000	
Iroquois river.....									140,000
Ledges pond.....								80,000	37,000
Little river.....								10,000	10,000
Michaud rocks.....						25,000	15,000		20,000
Nine Mile brook.....									30,000
Private pond, Power creek, Mr.									20,000
Zeno Martin.....									
Quisibis river.....									2,000
Siegas river.....								60,000	
Trout river.....								45,000	
Unique lake.....								125,000	25,000
								80,000	50,000
Lake Rond, Temiscouata Co., Que.									10,000
	75,000	1,137,000	825,000	408,403	20,000	85,000	30,000	715,000	388,486
Total distribution.....									3,683,889

DEPARTMENT OF FISHERIES

MIRAMICHI HATCHERY

	Atlantic salmon			Speckled trout				
	Ad- vanced Fry	Fingerlings		Ad- vanced Fry	Fingerlings			Year- lings
		No. 1	No. 2		No. 1	No. 2	No. 3	
Black river—Kent Co.....						3,000		
Black river—Northumberland Co.....				5,000			2,566	41
Buctouche river.....					4,000	500		
Burnt Church river.....					5,000			
Caraquet river.....				5,000				
Cocagne river.....					4,000	500		
Elmtree river.....					5,000			
Grand Aldouane river.....						4,000		
Green brook—Bartibog river.....				5,000				
Kouchibouguac river.....					4,000	500		
McGinnis brook.....					4,000	500		
Little river—Nipisiguit bay.....					5,000			
Little Southwest Miramichi river.....	450,000	392,000	50,000					
McKee Mills river.....					4,000	500		
Middle river.....	39,000							
Millstream—Nipisiguit bay.....					5,000			
Nappan river.....				5,000				
Nigadu river.....					5,000			
Northwest Miramichi river.....	1,035,000	64,000	125,000					
Millstream.....	101,000							
Sevogle river.....			200,000					
Stewart brook.....			23,350					
Trout brook.....		32,000						
Pabineau lake.....					4,000			
Pokemouche river.....				5,000				
Richibucto river, Coal branch.....					4,000	500		
River des Caches.....					5,000			
St. Nicholas river.....					4,000	500		
Salmon river.....					4,000	500		
Scoudouc river.....						3,800		
Southwest Miramichi river.....		178,500	100,000					
Barnaby river.....	101,000							
Cain river.....	90,000	172,900						
Renous river.....	101,000	45,000	50,000					
Dungarvon river.....	56,000	82,500						
Taxis river.....		85,200						
Tabusintac river.....	49,000	74,500						
Eskedelloc brook.....				5,000				
Tetagoche river.....	45,000	72,000						
Tracadie river.....				5,000				
Little Tracadie river.....				5,000				
	2,067,000	1,198,600	548,350	40,000	66,000	14,800	2,566	41

Total distribution..... 3,937,357

RESTIGOUCHE HATCHERY

	Atlantic salmon Fingerlings		Speckled trout	
	No. 1	No. 2	Fry	Fingerlings No. 1
Charlo river, north branch.....				23,801
Christopher brook.....				18,000
Black brook.....				5,000
Eel river.....				18,000
Jacquet river.....	90,000			
Loch Lomond.....			4,000	
Middle river.....	50,000			
Nipisiguit river.....	352,496			
Restigouche river.....	767,477	29,788		
Kedgwick river.....	160,096			
Little Main river.....	138,569			
Matapedia river.....	543,030			
Upsalquitch river.....	400,000			
Walker brook.....				5,000
	2,501,668	29,788	4,000	69,801

Total distribution..... 2,605,257

No.		Atlantic salmon			Brown trout hybrid yearlings	Sebago salmon	
		Ad- vanced fry	Fingerlings			Finger- lings No. 3	Year- lings
			No. 1	No. 3			
1	Atlantic Biological Station, St. Andrews, New Brunswick.....						
	Albert Co.—						
2	Crooked creek.....						
3	Little river.....						
4	Mechanic lake.....						
5	Point Wolfe river.....						
6	Pollett river.....						
7	Prosser brook-Little river.....						
8	Sodom lake.....						
9	Turtle creek-Petitcodiac river.....						
10	West river.....						
	Charlotte Co.—						
11	Bartlett brook.....						
12	Burns brook-Digdeguash river.....						
13	Chamcook lake.....					42,239	26,320
14	Clarence stream-Magaguadavic river.....						
15	Craig brook-Digdeguash river.....						
16	Digdeguash river.....						
17	Disappointment or Mistake lake.....						
18	Doak brook-St. Croix river.....						
19	Duck lake.....						
20	Big Eel brook.....						
21	Little Eel brook.....						
22	Gibson lake.....						
23	Green Brown brook-Kanus river.....						
24	Half Moon lake.....						
25	Kerr lake.....						
26	Lake Utopia.....						
27	Lepreau river.....						
28	Linton stream-Magaguadavic river.....		100,000				
29	McClary brook-St. Croix river.....						
30	McDougall lake.....						
31	Magaguadavic river.....		200,000				
32	Murchie brook-St. Croix river.....						
33	New river.....						
34	Red Rock lake.....						
35	St. Patrick lake.....						
36	Seal Cove brook.....						
37	Stein lake.....						
38	Welch lake.....						
	Kent Co.—						
39	Molus river.....						
	Kings Co.—						
40	Anagance river.....						
41	Ben lake.....						
42	Chisholm lake.....						
43	Hammond river.....						
44	Hatfield brook-Belleisle river.....						
45	Jack lake.....						
46	Kennebecasis river, headwaters.....						
47	Kennebecasis river, south branch.....						
48	McLeod brook.....						
49	Pichette lake.....						
50	Price brook.....						
51	Ray lake.....						
52	Robinhood lake.....						
53	Salt Springs brook-Hammond river.....						
54	Smith creek-Kennebecasis river.....						
55	Studholm brook or Millstream.....						
56	Trout creek-Kennebecasis river.....		100,000				
57	Wetmore dam-Kennebecasis river.....						
	Queens Co.—						
58	Canaan river, north forks.....						
59	Lake stream waters-Salmon river.....						
60	Salmon river.....		75,000				
61	Snowshoe lake.....						
	St. John Co.—						
62	Beaver brook-Mispek river.....						
63	Big Salmon river.....		70,000				
64	Black lake.....						
65	Black river.....	100,000	17,112	1,512			
66	Boaz lake.....						
67	Brandy brook-Mispek river.....						
68	Dolan lake.....						
69	Eagle lake.....						
70	Germain brook-Hammond river.....						
71	Graham lake.....						
72	Grassy lake.....						
73	Hanford brook.....						
74	Hanson river.....						
75	Henry lake.....						
76	Hopewell lake.....						

HATCHERY

Ouana- niche Two years	Rainbow trout		Speckled trout								No.
	Year- lings	Two years	Fry	Ad- vanced fry	Fingerlings			Year- lings	Two years	Five years	
					No. 1	No. 2	No. 4				
					11,500						1
	545	719			5,000						2
						1,500					3
					5,000						4
					10,000						5
					5,000						6
					5,000						7
					5,000						8
					5,000						9
					10,000						10
					10,000						11
					5,000						12
				15,000	10,000						13
					10,000						14
				25,000							15
				20,000							16
					5,000						17
							750				18
					2,000						19
					2,000						20
					5,000						21
					5,000						22
							750				23
					5,000						24
				30,000	5,000						25
					5,000						26
					10,000						27
					5,000						28
					10,000						29
					5,000						30
					10,000						31
					5,000						32
					10,000						33
					5,000						34
					5,000						35
					2,000						36
					10,000						37
					5,000						38
				10,000							39
				10,000							40
			10,000				500				41
				25,000							42
							500				43
							500				44
					10,000						45
					10,000						46
				10,000		1,000					47
											48
					5,000						49
					5,000						50
					5,000						51
							500				52
					10,000						53
					5,000						54
											55
					15,000						56
				5,000							57
					5,000						58
					3,000						59
					3,000						60
											61
					3,000						62
				5,000							63
							1,000				64
					4,000						65
					5,000						66
							1,000				67
				10,000							68
					2,000						69
					3,000						70
				10,000							71
											72
					10,000						73
											74
				15,000	10,000						75
					3,000						76

No.		Atlantic salmon			Brown trout hybrid yearlings	Sebago salmon	
		Ad- vanced fry	Fingerlings			Finger- lings No. 3	Year- lings
			No. 1	No. 3			
77	Hunter lake.....						
78	Lily lake-Rockwood Park.....						
79	Little river.....				1,885		
80	Loch Lomond.....						
81	Loch Lomond, third lake.....						
82	McDonald lake.....						
83	Milligan lake.....						
84	Moose creek.....						
85	Musquash river, west branch.....						
86	Sadler lake.....						
87	Southern lake.....						
88	Stephenson's brook pond-Loch Lomond.....						
89	Stoker brook-Mispek river.....						
90	Treadwell lake.....						
91	Tyne Mouth creek.....	75,000					
92	Wilmot brook-Loch Lomond.....						
	Sunbury Co.—						
93	Brisley brook.....						
94	Burpee brook-French lake.....						
95	Mersereau brook.....						
96	Oromocto river.....		75,000				
97	Otter brook.....						
98	Rockwell stream.....						
99	Shin creek.....						
100	Three Tree creek.....						
	Westmorland Co.—						
101	Hayward brook-Anagance river.....						
102	Memramcook river.....						
103	North river.....						
104	Petitcodiac river.....	100,000					
105	Tait brook-Memramcook river.....						
	York Co.—						
106	Baker brook.....						
107	Davis brook-Magaguadavic river.....						
108	Lake George.....						
109	Harvey lake.....						
110	Little McAdam stream.....						
111	Magaguadavic river.....						
112	Mink lake.....						
113	Mink stream.....						
114	Trout brook, upper.....						
115	Spring brook (James Vail)-Magaguadavic river.....		10,000				
116	Spring brook (Lemuel Vail)-Magaguadavic river.....						
		275,000	647,112	1,512	1,885	42,239	26,320

Total distribution..... 1 715,236

—Continued

Ouana- niche Two years	Rainbow trout		Speckled trout								No.
	Year- lings	Two years	Fry	Ad- vanced fry	Fingerlings			Year- lings	Two years	Five years	
					No. 1	No. 2	No. 4				
					2,000						77
					2,000			566	267	9	78
					10,000		500	2,700	1,000		79
					4,000						80
						1,000					81
					10,000						82
			20,000		10,000						83
					10,000						84
							750				85
							1,000				86
					10,000						87
					5,000						88
					3,000						89
				10,000							90
					10,000		1,000				91
											92
					5,000						93
					5,000						94
					5,000						95
					10,000						96
					5,000						97
					10,000						98
					10,000						99
					10,000						100
					5,000						101
					4,000						102
					10,000						103
											104
					5,000						105
					5,000						106
					3,000						107
					6,000						108
					9,000						109
					3,000						110
					3,000						111
					3,000						112
					3,000						113
					3,000						114
											115
					3,000						116
1,612	545	719	35,000	195,000	471,500	3,500	8,750	3,266	1,267	9	

PRINCE EDWARD ISLAND
CARDIGAN REARING PONDS

	Rainbow trout Fingerlings			Speckled trout Fingerlings	
	No. 2	No. 3	No. 4	No. 3	No. 4
Kings Co.—					
Bear river.....					5,000
Big brook-Fortune river.....					10,000
Big pond.....					10,000
Brudenell river.....					5,000
Coogan stream-Morell river.....					10,000
Crane's pond-Morell river.....				5,000	
Dingwell stream-Fortune river.....				6,000	
Fitzpatrick's pond-Seal river.....				5,000	
Goose river.....					3,000
Hay river.....					5,000
Head of Cardigan river.....					770
Leslie's pond-Souris river.....					1,000
McAulay brook-Morell river.....					3,000
McCaskil river.....					3,000
McDonald's pond-North lake.....					3,000
McInnis pond-Souris river.....					3,000
McKinnon stream-Morell river.....					5,000
McLeod's pond-Midgell river.....					5,000
McPherson's pond-Montague river.....				5,000	
McRae's pond-Montague river.....				5,000	
Molyneaux pond-Sturgeon river.....				5,000	
Montague Electric pond.....				6,000	
Montague river.....					5,000
Mooney's pond-Morell river.....				5,000	
Munn brook-Brudenell river.....					2,000
North lake.....					5,000
Poole's pond-Montague river.....					3,000
Priest pond.....					3,000
Quigley's pond.....				5,000	
Webster's pond-Marie river.....					5,000
Prince Co.—					
Bain creek.....				5,000	
Barbara Weit river.....					2,000
Barlow pond-Grand river.....				3,000	
Beaton stream-Percival river.....				4,000	
Bell's stream (Cape Traverse).....					3,000
Brae river.....				4,000	
Conroy's pond.....				5,000	
Currie's pond-Little Pierre Jacques river.....					4,500
Doyle stream.....				5,000	
Dunk river.....				8,000	
Gard's pond-Mill river.....				4,500	
Gordon's pond-Kildare river.....				5,000	
Haywood's pond-Tignish river.....				5,000	
Kane's stream-Mill river.....				5,000	
Leard's pond-Trout river tributary to Lot 10 river.....				4,500	
McArthur's pond-Foxley river.....					4,000
McAusland's pond-Mill river.....				5,000	
McWilliam's pond-Big Pierre Jacques river.....					4,500
Marchbank's pond-Tyne river.....					3,000
Rix's pond-Kildare river.....				5,000	
Round pond.....				5,000	
Sheep river.....				5,000	
Tuplin's pond-Indian river.....				5,000	
Wilmot river.....					4,000
Wright Leard's pond-Dunk river.....					5,000
Queens Co.—					
Ballem stream.....					3,000
Beer's pond-Clyde river.....				5,000	
Belle river.....				6,000	
Black river.....					3,000
Brander's pond.....					4,000
Cousin's pond.....					5,000
Crooked creek.....				5,000	
Dixon's pond-Sable river.....				6,000	
Glenfinnan lake.....		23,000	36,490		
Holmes' pond-Sable river.....					3,000
Hope river.....				6,000	
Lake Verde.....					4,000
Lanes brook-Vernon river.....					2,000

CARDIGAN REARING PONDS—*Continued*

	Rainbow trout Fingerlings			Speckled trout Fingerlings	
	No. 2	No. 3	No. 4	No. 3	No. 4
Queens Co.— <i>Concluded</i>					
Leard's pond-Pisquid river.....				8,000	
McLeod's pond-Belle river.....					2,000
McLeod's pond-Murray river.....					5,000
McPherson's pond-Flat river.....				6,000	
McPherson's pond-Pinette river.....				8,000	
Parson's pond-Glynde river.....				6,000	
Pisquid or O'Keefes lake.....	12,000	15,000	6,000	8,000	
Rackham's pond-Wheatley river.....				6,000	
Simpson's pond-Hope river.....				5,000	
Stevenson's pond.....				5,000	
West river.....				7,500	5,000
	12,000	38,000	42,490	209,500	160,770
Total distribution.....				462,760	

KELLY'S POND HATCHERY

	Atlantic salmon		Speckled trout		
	Ad- vanced fry	Finger- lings No. 1	Ad- vanced fry	Fingerlings	
				No. 1	No. 3
Kings Co.—					
Big pond.....				10,000	
Coogan stream-Morell river.....				10,000	
Goose river.....				10,000	
Hooper's pond.....				10,000	
Leard's, below Mills-Morell river.....	56,400	53,200			
McKinnon brook-Morell river.....				10,000	
Mooney's bridge-Morell river.....		53,200			
Morell river.....		226,080			
Naufrage river.....		53,000			
Quigley's stream-St. Peters bay.....		34,920			
Quigley's pond.....				7,823	
Red bridge-Morell river.....		53,000			
Schooner pond.....		53,200			
Warren's pond-Head of East river.....				10,000	
Prince Co.—					
Dunk river.....			18,000		
Tryon river.....				9,600	
Queens Co.—					
Andrews pond-East river.....				6,852	
Callaghan's pond-East river.....				10,000	
Clark's stream-East river.....				10,000	
Coles pond-North river.....				7,260	
Crapaud river.....				9,600	
Gates pond-North river.....				7,260	
Graham's pond-Hunter river.....			5,000		
Hardy's pond-Winter river.....				10,000	
Pleasant Grove-Winter river.....				9,860	
Rackham's pond-Wheatley river.....			5,000		
Vessey brook-Winter river.....					24,316
Winter river.....				7,369	
	56,400	526,600	28,000	155,624	24,316
Total distribution.....				790,940	

BRITISH COLUMBIA

ANDERSON LAKE HATCHERY

Sockeye salmon
Eyed eggs

Hillier creek—Maggie lake.....	1,033,359
Total distribution.....	1,033,359

APPENDIX No. 3

ENGINEERING BRANCH

REPORT BY CHARLES BRUCE, A.M.E.I.C., CHIEF ENGINEER

The Engineering Branch is responsible for all works of a technical nature which come under the department in the Maritime Provinces and British Columbia where the fisheries are administered by the federal government, and the branch also undertakes the design and supervision of construction of bait freezers and of fishways which may be built by the owners of dams under the requirements of the Fisheries Act.

When such action is requested, the branch assists and co-operates with fish and game associations by conducting surveys and providing designs for the establishment by them of hatcheries and rearing ponds. It is also responsible for the administration, under the deputy minister, of leasing of areas for oyster farming in the Maritime Provinces and furnishes technical advice to the Fisheries Research Board in matters of an engineering nature.

All work of the branch in British Columbia is undertaken under the direct supervision of Resident Engineer John McHugh, with headquarters at Vancouver, B.C.

BUILDING FISHWAYS AND CLEARING RIVERS

Due in some measure to almost continuous high water conditions, no serious obstructions to the ascent of fish in Maritime Province streams required attention during the open water season of 1938.

The abandonment of artificial fish cultural work for the propagation of salmon in Pacific Coast waters has caused attention to be focused more than ever on the preservation, improvement and development of natural spawning grounds which lie in the great numbers of streams draining the British Columbia coast line and are in many instances located at places difficult of access.

Works in this regard involve the removal of obstructions to the ascent of fish which may have accumulated as a result of land slides, forest rubbish which is carried down the streams during freshets, large trees growing along the banks which may be undermined by high water and fall into the streams, and in some instances materials either placed or carried into the streams as a result of logging operations. Wherever possible such operations are closely watched and the loggers are required to remedy the conditions they bring about, but it is quite possible that the damage may not occur until long after they have removed from the locality.

Continual attention is given to the extension of spawning areas by the improvement of conditions for ascending fish past natural barriers such as falls and rapids, thus affording access to new spawning grounds which were not previously available. It is necessary before such work is undertaken to explore the stream bed above the barrier to determine whether suitable gravel beds exist of sufficient extent to give returns commensurate of the contemplated improvements.

Following is a detailed statement of works coming under this heading, during the year 1938.

NOVA SCOTIA

Tusket River, Yarmouth County.—Adjustments were made to the fishway in the power dam and a complete instrumental survey was completed from which designs for a proposed alternative fishway at the generating station were prepared.

Salmon River, Yarmouth County.—Inspection of several dams for the purpose of determining if fishways should be installed. As the lower dams on the river are opened up in the spring, it was decided that conditions for the ascent of fish were satisfactory.

Medway River, Queens County.—Inspection of the conditions for the ascent of salmon at South Brookfield and a survey of the power canal at Charleston to provide a means for descending fish.

Petite Riviere, Lunenburg County.—Interview with the town authorities of Bridgewater in connection with the provision of a fishway in a dam which they propose to build, for hydro-electric purposes, on this river and inspection of the site.

LaHave River, Lunenburg County.—Inspection, survey and estimate for repairs to the fishway in the Wentzell Lake dam.

East River, Lunenburg County.—The river bed below a small power development was channelled to confine the flow of water and thus improve conditions for the ascent of salmon.

Branch Brook, Lunenburg County.—Several years ago a number of obstructions were removed from the lower reaches of this stream and, as this had resulted in an appreciable increase in the numbers of fish which ascended, it was considered desirable to continue the work throughout the upper reaches of the stream.

Nictaux River, Annapolis County.—As large numbers of salmon smolt were being destroyed in passing through the turbines of the Nictaux Falls power development, a rack and sluice to divert them to the river were installed.

Gaspereau River, Kings County.—Large numbers of young gaspereau were destroyed, during the previous year, in passing through the turbines of the Black River power development which operates partly with water furnished through a diversion canal from the Gaspereau river. As a possible means of overcoming this harmful condition, the river was blocked to prevent the parent fish from ascending to the lakes from which the canal runs. While the fish spawned in the head pond of the Whiterock power development, examinations indicated that the returns were not likely to be satisfactory. It was accordingly deemed desirable to provide a method of screening the canal, if this were at all practicable, and again permit the parent fish to ascend to their natural spawning grounds in the lakes. An instrumental survey of a proposed location for screens was completed but the operating company is convinced that the maintenance of such screens would not be feasible. Further attention will be given the matter during the coming season when it is hoped that a satisfactory solution may be reached.

Mersey River, Queens County.—The fishway for the Nova Scotia Power Commission's new development on the Mersey river at Cowie falls, designs for which were made by the Engineering Branch during the previous year, was completed by the commission during 1938. The dam at this plant is over forty feet high and the fishway has proved efficient for the ascent of salmon.

Tangier River, Halifax County.—A further inspection and survey were made in connection with the provision of a means for the ascent of fish past the power

dam on this river. The mining company which owns the dam has been inactive for the past two or three years and the dam has fallen into such a poor state of repair that a fishway would not be feasible. The trustees of the company requested that action to have an opening made in the dam be deferred until the prospects of a sale of the property were determined and this was acceded to.

Ingrams Brook, Inverness County.—Information was obtained and designs prepared for a fishway in the dam on this stream, which affords a water supply for the Margaree hatchery.

North River, Victoria County.—Four situations on this river, where falls make it difficult for salmon to ascend, were surveyed and plans of remedial works were prepared. The work will be undertaken during the coming year.

Osier River, Halifax County.—An inspection of the situation at a dam where the owner had been required to install a fishway was made, and modifications to the prescribed fishway were agreed upon with the owner.

NEW BRUNSWICK

At the request of the State of Maine Fish and Game association, an engineer inspected a fishway at the Aroostook River power development, and advised the association regarding repairs and modifications to make this fishway effective.

A request from this association that the possibilities of providing a means for the ascent of salmon over Grand falls on the St. John river be looked into was also met by a general inspection of the situation. The total fall at this point is over eighty feet and it is questionable, even if an efficient fishway could be provided, whether the returns would be commensurate with the cost of construction.

Inspections were also made of the dam on the Meduxenekeag river at Woodstock, of the Robertson Lake dam and of the old stone dam near the mouth of the Mispec River.

BRITISH COLUMBIA

Obstructions consisting of logs, roots and debris washed or carried into the stream beds by freshets, which effectively barred the passage of salmon to their spawning grounds were removed from the following streams:—Atnarko river, Blood creek, Brown creek, Chicken creek, Clark creek, Coal creek, Cooks creek, Dena river, Elk creek, Gates creek, Grassy Bay creek, Hobarton river, Johnstone river, Lawson creek, Nameless river, Nanaimo river, Open Bay creek, Salmon river, Springer creek, Stark creek, Stowe creek, Sucker creek, Vine river, Waterloo creek.

In addition, minor obstructions were removed at various places by the local fishery officers and boat crews in the course of their inspection or patrol duties.

Sedgewick Bay Creek.—A low fall, which proved a barrier to ascending fish, was overcome by partly breaking it down and by introducing a step, by placing and anchoring a large log across the stream bed, from bank to bank.

Maggie River Fishway.—Work on this fishway which had not been completed in the previous year was continued. Two cross walls which had been damaged were repaired and a relief pass, together with a by-pass, both at the head of the falls, were opened up. Maggie river is subject to extreme freshets, and it will probably be found necessary after further study to provide gates in the two relief channels to permit of regulating the flow through the fishway under the various water conditions that obtain.

During the past year 235 coho salmon were counted through this fishway, and it is possible that larger numbers passed through, as their movements could not be observed owing to the deluge of spray enveloping the entire falls

during high water stages. It is hoped that further examination and study of additional requirements at this situation can be made during the coming year.

Ingram River Fishway.—Following a decision to proceed with a fishway over the falls at the mouth of this river, which drains into Ellerslie channel, an examination was made to complete data for the preparation of the necessary plans and specifications. Due to the lateness of the season when this was completed and the isolated location of the work, it was considered desirable to postpone the actual construction until the coming summer.

Stamp Falls Fishway.—The flow of water leading to this fishway has during the past few years become restricted because of the outer rock walls crumbling away and allowing some of the water to escape before reaching the inlet to the fishway. Particularly at low stages, this shortage of water was gradually rendering the fishway ineffective. Three distinct gaps totalling 100 feet in length, through which water escaped, were closed with concrete walls suitably reinforced and anchored, and it was found on their completion the flow through the fishway was increased three times. The fishway is now functioning satisfactorily.

Puntledge River Fishway.—The District Engineer of Public Works at New Westminster collaborated with an engineer of this branch with a view to a solution of the problem of providing an efficient fishway in the impounding dam on that river. An inspection of the situation was made and the difficulties that have been experienced discussed on the ground. This matter is still receiving attention.

Great Central Lake Fishway.—An inspection was made of the conditions at this fishway, where, due to waste through the dam, the flow through it is restricted. Remedial measures which would involve considerable expense were suggested, but the logging company which operates this dam did not feel in a position to carry them out. The company has given assurance that it will take the necessary action to insure an adequate flow through the fishway by more temporary means.

Lang or Wolfshonn Creek Fishway.—At the request of the Provincial Game Commission, an engineer of the branch inspected the situation at this creek, where a diversion weir was obstructing the movement of trout between Duck and Haslam lakes. After procuring the necessary data, a design and specification for a fishway were prepared, which it is expected will largely solve their problem.

Examinations were also made, and reports with estimates prepared covering the removal of obstructions in Captains Cove, Twin, Pierre and Tachek creeks, the latter three being tributary to Babine lake on the Skeena River system, and an engineer attended two public hearings arranged by the Provincial Lands Department in connection with objections by the local residents of Roberts creek to the booming of logs on the foreshore adjoining this summer resort. The conclusion in this matter was that salmon would be properly protected under the provisions of the Fisheries Act and that the objection to booming was not one for consideration by the department.

FISH CULTURAL ESTABLISHMENTS

In addition to the usual repairs and upkeep of the various establishments the following works were undertaken:—

NOVA SCOTIA

Antigonish Hatchery.—Due to extensions in the rearing pond facilities at this hatchery and the probability that a sub-hatchery would be established

there in the near future, it was necessary to increase the water supply from the dam on South river. A survey was made and a 20-inch wood stave pipe line some 1,100 feet long, with connections to the various rearing and brood ponds, was laid and repairs to the existing 20-inch pipe line were completed.

Lindloff Hatchery.—Following the decision to establish a permanent hatchery to replace the existing sub-hatchery at this place, plans and specifications for a hatchery building and dwelling were prepared. The hatchery measures 25 feet by 65 feet with an ell 10 feet 10 inches by 15 feet 8 inches, providing a hatching room 25 feet by 52 feet 5 inches, office, feed room, coal room and storage space in the entire attic. The hatching room is equipped with a supply trough and thirty hatching troughs each 16 feet long, $10\frac{1}{2}$ inches wide and $6\frac{1}{2}$ inches deep. The water supply is brought into the hatchery by a 6-inch wood stave pipe from the flume which supplies the rearing ponds at this establishment. The dwelling measures 30 feet square one and one-half story, with full basement, living room, dining room, kitchen, bathroom, four bedrooms and summer kitchen. An electric lighting plant provides lighting for both buildings with an extension to the garage and icehouse, and the domestic water supply for the dwelling is furnished by an electric pump and automatic pressure system and a septic tank provides for the disposal of sewage. The buildings were erected by contract under the supervision of the Engineering Branch.

Grand Lake Rearing Ponds.—A dwelling similar to that described for the Lindloff hatchery was built at this establishment by contract under engineering supervision. Electric power was available and the building is wired for lighting. The domestic water supply is obtained from a well with an electrically operated pump, and a septic tank affords disposal for sewage.

Mersey River Rearing Ponds.—Instrumental surveys were made for the establishment of a rearing pond system on the Mersey river, covering three possible sites: Lower Great brook, a site at No. 2 Power Development and one at No. 3 Power Development; plans and estimates of construction costs were prepared.

River Phillip Salmon Pond.—A complete survey of the facilities at this pond was made, including the establishment of boundaries of land which the department would require, provided it is decided to continue operations at this point.

General Inspections.—General inspections were made at Bedford hatchery, Cobequid hatchery, Coldbrook rearing ponds and Kejimikujik rearing ponds, and in Prince Edward Island the Cardigan rearing ponds were inspected and report on additional work to be done there submitted.

NEW BRUNSWICK

Charlo Hatchery.—Complete plans and specifications for a hatchery establishment on the South branch of the Charlo river were prepared and the construction of the buildings was completed by contract under engineering supervision. These include a dwelling, similar to that described for the Lindloff hatchery in Nova Scotia, a main hatchery building, a sub-hatchery building and another building.

The main hatchery, which measures 37 feet 8 inches by 63 feet, contains the hatching room, measuring 37 feet 8 inches by 51 feet 2 inches, office, coal room, toilet and storage space. The hatching room is fitted with sixteen concrete floor troughs each 20 feet 6 inches long, 2 feet wide and from 9 to 12 inches deep, and forty hatching troughs 20 feet long, $10\frac{1}{2}$ inches wide and $6\frac{1}{2}$ inches deep.

The sub-hatchery, which measures 28 feet 8 inches by 68 feet 6 inches, contains a hatching room, measuring 28 feet 8 inches by 61 feet 5 inches, work-room, coal room and storage space. A gravel floor with plank walks in the passages between the troughs is provided in the hatching room with the purpose in view of installing concrete floor tanks if these are required at any future time. The room is equipped with twenty hatching troughs each 20 feet long, 20½ inches wide and 10 inches deep.

The additional building, which measures 21 feet by 65 feet, contains a double garage, work room, feed room, icehouse, and a cold storage room for holding fish food, in which ice and salt is used for refrigeration. The electric lighting plant for all the buildings is installed in the work room, and power for operating a food grinder, used in preparing fish food, is also obtained from this plant.

In addition to the work completed by contract, as above outlined, the department undertook the installation of the water supply under the direct supervision of an engineer. This included the construction of a concrete dam and headworks at the crest of Charlo falls and laying approximately 1,800 feet of 18-inch diameter wood stave pipe, with connections to the hatchery buildings and for rearing ponds which will be constructed as the needs of the plant demand. For a considerable distance the pipe line runs along a steep side hill which necessitated benching and blasting and for distances of 75 and 235 feet, respectively, where the ground surface was much below the gradient line, it is carried on trestle work. Considerable work was also done in clearing wooded land on the site where rearing ponds will be built, and this area was cleaned of all roots and the main drains for the future construction of ponds were installed.

This hatchery replaces the old Restigouche hatchery at Flatlands, N.B., and was placed in operation during the year.

FISHERIES RESEARCH BOARD

Survey of Upper Skeena Watershed.—An engineer accompanied Doctors Clements and Pritchard in an examination of the spawning grounds in the upper waters of this river for the purpose of considering the possibility of construction counting fences for salmon in the various tributaries which included the Lakelse system, Babine, Bulkley, Morice, Kispior, Telkwa, Copper and Kitsumgalum rivers. A great deal of information regarding conditions on these rivers was assembled, which will be of value both from the standpoints of feasibility and cost, should it later be decided to proceed with such works.

Cowichan Lake Rearing Ponds.—Six new rearing ponds were constructed at Cowichan Lake hatchery which is operated by the Fisheries Research Board. The ponds each measure forty feet long, six feet wide and three feet deep.

OYSTER LEASING

The leasing of areas for oyster farming in Prince Edward Island was continued and 198 leases were completed. The total number of leases in effect at the end of the year was 482, covering 1,388 acres, and in addition 1,106 applications were before the department. Action on an application includes investigation of the area it covers in order that the applicant may be advised regarding the possibilities for cultivating oysters and a survey to define the boundaries. Due to the great accumulation of applications and to the fact that leasing in Nova Scotia was becoming active, it was necessary during the year to engage an additional surveyor, and his appointment has greatly assisted in disposing of applications which had accumulated beyond the capacity of the then personnel to cope with. Surveys of this nature can only be undertaken, in many instances,

during fine and reasonably calm weather in summer and in fine weather in winter. A total of 444 surveys for leases was completed during the year, including 352 surveys for new leases and 63 re-surveys made at the request of lessees the boundaries of whose areas had been lost. In Nova Scotia 24 surveys of new areas and 5 surveys of old provincial leases were completed.

In addition to surveys for leases the following work was completed: (1) Triangulation and stadia survey of Wolf inlet and the preparation of a plan with grid to facilitate the location of leases; (2) similar survey of Brae bay and location of boundaries of area reserved for quahaug fishing; (3) survey of north boundary of area in Trout river, Malpeque bay, which was closed to fishing for direct marketing of oysters due to pollution; (4) re-survey of the department's reserved experimental area on the Cooper bed, Malpeque bay; (5) re-surveys of the public picking areas in Bideford river, Malpeque Bay area; (6) surveys for the location of additional mud-digging areas off Bentinck cove and off Princeton and Indian river, Malpeque Bay area; (7) survey and establishment of beacons on grid lines of the Sedgewick Cove area, Bedeque bay, to facilitate the location of lease boundaries; (8) survey of an area reserved for experimental purposes in connection with oyster cultural work at Stony point, Bras d'Or Lakes area, and of an additional reserved area at Malagash.

A detailed report of oyster culture work under the department will be found in Appendix No. 4.

MISCELLANEOUS

Cold Storage Plants.—During the year an agreement was entered into with R. Hendsbee and Company, of Half Island Cove, N.S., under which the department subsidized the conversion of a building on their property into a cold storage plant for bait and fresh fish. Plans and specifications for the plant were reviewed and approved. Construction work was commenced but will not be completed until the coming year.

The question of the design of a standard plan for bait-holding plants for fishermen's organizations was taken up in consultation with the Chief Supervisor of Fisheries at Halifax and, as a result, plans and specification of such a plant were prepared. The plans provide for various sizes of icehouse and trawl tub room with a view to meeting the requirements at different places, should the fishermen's organizations find that such plants are necessary.

Marine Ways, Poplar Island and North Arm, B.C.—During the early weeks of the year, the spring freshets in the Fraser river caused further demolition of the Poplar Island bridge and as a consequence the power service to the Poplar Island Marine station became disrupted. It was necessary to dispense with the bridge across the North arm as a means of carrying the power line and to build in its place two pile driven piers or dolphins to carry the wires across the river at a height where they would not interfere with navigation. The work was completed by contract under engineering supervision. Since that time the Department of Public Works has completed plans for a new marine station on the mainland side of the North arm, after various consultations with the Engineering Branch, and work has now commenced on the construction.

Bonneville, Rock Island and Grand Coulee Dams, Washington, U.S.A.—In company with the Deputy Commissioner of Fisheries for British Columbia and the Chief Supervisor of Fisheries, an engineer of the department visited the above projects in Washington state. All three projects are on the Columbia river and are causing concern to the fishing industry which fears for the future well being of the river in so far as that industry is concerned. Salmon are using and passing through the fish ladders in the Bonneville and Rock Island dams and ascending

the river to the Grand Coulee dam, which will, when completed, be 550 feet high and present an obstruction considered impracticable to overcome. Instead, very elaborate means are being provided to spawn artificially those salmon which pass the Bonneville and Rock Island dams and develop fry which will be planted at suitable points in tributary streams. The full effect of these high works upon the fisheries of the Columbia river will not be definitely known until at least one and possibly more complete cycles have been completed. In the meantime, there is a big educational value in following the situation as it develops from year to year and, in view of possible future harnessing of the larger rivers in British Columbia for power purposes, it is advisable to keep in touch with conditions on the Columbia river until a conclusive decision has been reached with respect to the effect of high dams in salmon streams.

Fisheries Station, Schooner Passage, Rivers Inlet, B.C.—The float at this station, together with all the mooring piles, was renewed by the Department of Public Works on data furnished by the Engineering Branch.

APPENDIX No. 4

REPORT ON OYSTER CULTURE WORK UNDER THE DEPARTMENT OF FISHERIES FOR THE YEAR 1938-1939

BY A. W. H. NEEDLER, PH.D., FISHERIES RESEARCH BOARD
OF CANADA

In the fiscal year 1938-39 oyster culture work was carried on by the Department of Fisheries in Prince Edward Island and Nova Scotia. Work under the present program has been in progress in Prince Edward Island since 1928. In Nova Scotia some preliminary investigations were commenced in 1934 but intensive work was not started until 1936.

The Dominion Government by an agreement with the province of Prince Edward Island in 1928 obtained jurisdiction over the province's oyster areas and undertook to develop its oyster industry. As the most important step in that direction the establishment of oyster farming was planned in those suitable areas which did not support a public fishery. Experimental oyster farming was commenced by the department in 1928 and scientific investigations by the Fisheries Research Board (then the Biological Board of Canada) in 1929, and these have been continued in close co-operation. The leasing of oyster ground was started in 1931 and development of oyster farming has been rapid, especially in the Malpeque Bay region. For a more detailed review of the earlier course of the program reference may be made to appendices of earlier annual reports of the department.

In 1936 the Dominion Government entered into an agreement with the province of Nova Scotia similar to that made with Prince Edward Island in 1928. Jurisdiction over the oyster areas of the province was transferred to the Dominion which undertook development of the industry. Intensive investigations of the conditions for oyster culture were commenced in 1936 in the two important regions—the Bras d'Or lakes of Cape Breton and the gulf of St. Lawrence coast of the mainland. The work in Nova Scotia is still at an early stage and ground was first offered for lease in February, 1938.

The greatest development of oyster farming has been in the Malpeque Bay region and investigations and experimental farming in co-operation with the Fisheries Research Board have centred at the Prince Edward Island Biological Station at Ellerslie. General headquarters for the work as a whole have been maintained there and much of the information and experience gained in Prince Edward Island is applicable in Nova Scotia. Intensive work is in progress in the Bras d'Or lakes near Orangedale and on the Northumberland Strait coast at Wallace and Malagash to study the special problems of those regions. While the work is, for convenience, reported below separately for the two provinces, it is made one by the common value of the results of investigations, by common planning and by the use of personnel and other resources in common.

While the general prospects for the oyster farming industry are good it must be remembered that it is still in an early stage of development. There has been a great increase in the effort to grow oysters and a corresponding increase in the yield. Even in the Malpeque Bay region, however, where the development started first, more money is being spent than is being received for the oysters sold. The industry can hardly be considered to have reached maturity until the total receipts exceed the total expenditures. With increasing production marketing is becoming more important. The final establishment of a stable industry depends on the continued development of economical methods of culture and of adequate markets and marketing methods.

PRINCE EDWARD ISLAND

In 1938-39 there was a further increase in oyster farming in Prince Edward Island especially in the Malpeque-Cascumpeque region. The oyster mortality in the Charlottetown region continued to spread with the result that the public fishery in tributaries of Hillsborough bay has been almost entirely destroyed. Supervision of the industry from the public health standpoint has been extended and progress has been made in the development of procedures for handling oysters produced in polluted areas. Investigations on methods of production have been continued. Some attention has been given to improvement of grading in order to develop more stable marketing. These aspects of the development in 1938-39 are reported in greater detail below.

On November 25 a particularly heavy storm occurred which caused some damage to equipment for oyster farming and even to oyster stocks. The full extent of the damage will not be known until more thorough examination of the grounds is possible early in 1939.

1. *Development of Leased Areas.*—Table I which follows summarizes the development of oyster farming in Prince Edward Island in 1938. It is compiled from individual statements obtained from all oyster farmers and while complete returns are not always obtainable and the figures are, therefore, sometimes less than the truth it gives a reliable conservative approximation.

TABLE I.—SUMMARIZING THE DEVELOPMENT OF AREAS UNDER CULTIVATION IN PRINCE EDWARD ISLAND TO 1938

Region	Year	Number of Areas under Cultivation	Approximate Total Area	Oysters Planted	Oysters Sold	Shells Used for Spat Collection	Card-board Spat Collectors used
			(acres)	(bbl.)	(bbl.)	(bu.)	
Malpeque-Cascumpeque, including Darnley and New London bays.	1932	26	110	254	0	1,500	0
	1933	47	203	935	181	1,600	0
	1934	85	388	1,516	434	1,050	1,254
	1935	101	453	1,303	979	645	3,350
	1936	202	862	3,342	1,093	1,011	13,600
	1937	336	1,314	3,192	1,948	25,000	55,600
	1938	457	1,729	5,968	3,451	3,000	98,000
Rustico to Savage bays.....	1933	9	41	428	50	400	0
	1934	13	63	595	92	2,650	0
	1935	26	116½	750	145	4,300	0
	1936	29	128	38	1	930	440
	1937	31	137	21	0	25	0
	1938	31	137	15	0	38	0
North Lake to Pinette river...	1935	11	16	136	0	Some	0
	1936	12	18	53	3	Some	0
	1937	16	29½	22	0	25	0
	1938	22	50	46	61	4	0
Bedeque bay area.....	1937	65	179	1,934	0	0	0
	1938	69	184	3,594	788	0	0
Brae Harbour and Wolfe inlet...	1937	15	30	6	0	0	0
	1938	15	30	4	0	0	0
Total.....	1932	26	110	254	0	1,500	0
	1933	56	244	1,363	231	2,000	0
	1934	98	451	2,111	526	3,700	1,254
	1935	138	585½	2,189	1,124	5,000	3,350
	1936	243	1,008	3,433	1,097	1,900	14,040
	1937	463	1,689½	5,175	1,948	25,000	55,600
	1938	594	2,130	9,627	4,300	3,042	98,000

The total oyster farming activity again shows a great increase over 1937. This has been principally in the Malpeque-Cascumpeque region. The mortality of oysters in the Charlottetown region has continued to hinder development of oyster farming in the eastern part of the Province. The development in the Bedeque Bay area has been associated with the closure of the bay inside Indian and Phelan points to direct marketing and the re-laying of oysters for purification. Some delay in development in certain areas has been caused by the need for investigation of local conditions from a public health standpoint. Reserves for quahaug fishing were set aside in Brae harbour but development there and in Wolfe inlet has been delayed further awaiting results of the examination of the situation there as regards pollution. Interest in oyster farming is general in the province but there has been as yet little substantial development except in the Malpeque-Cascumpeque and Bedeque Bay regions.

2. Malpeque-Cascumpeque Region.—Conditions continued promising in this region where oyster farming first became established and where the benefits of experimental farming and other activities of the Department have been felt most directly. Additional information on the industry in this region is given in Table II.

It is impossible to give adequate figures for many aspects of the development, such as, for example, cleaning and hardening of ground, removal of mussels or starfish, separation of clusters, spat collection through cleaning ground at the proper time, transfers of oysters from producing and growing grounds to maturing grounds, etc. In these ways much effective work is being done for which no details are given in Table II although it is included in the figures for the totals of work and materials used in development.

TABLE II.—OYSTER FARMING IN THE MALPEQUE-CASCUMPEQUE REGION IN 1935, 1936, 1937 AND 1938

—	1935	1936	1937	1938
Number of areas under cultivation.....	101	202	336	457
Barrels of oysters planted.....	1,303	3,342	3,192	5,968
Barrels of oysters sold.....	979	1,093	1,948	3,451
Cardboard spat collectors used.....	3,350	13,600	55,600	98,000
Wages paid for development of areas.....	\$2,137	\$ 6,077	\$11,532	\$16,371
Money spent for materials used in development.....	\$1,665	\$ 7,351	\$14,305	\$27,484
Days' work by lessees.....	1,126	3,321	4,300	7,022
Value of time spent by lessees at \$1.75 per day.....	\$1,971	\$ 5,812	\$ 7,525	\$12,289
Estimated total value of work and materials used in development.....	\$5,773	\$19,240	\$33,332	\$56,144

The total expenditure in 1938 was over \$56,000, an increase of over 60 per cent over 1937. The yield also increased more than 60 per cent but the value of the oysters produced is still much less than the total expenditure. Some oyster farmers have reached the stage where receipts are greater than expenditures. The industry as a whole, however, is still expanding and spending for the future.

There has been a great increase in the use of natural grounds for the rearing of spat obtained on cardboard collectors. This promises some reduction in the cost of small oysters for planting purposes. Two kinds of ground have been used for this purpose. The successful experiments by the department in 1937 have led to the extensive use of gravel flats about Little Curtain island by various oyster farmers. In spite of losses due to shifting of bottom and of oysters in heavy storms these operations have been profitable. The expense is low and the product of good quality. There has also been an increase in the

use of the narrow shore zone of firm bottom in sheltered creeks. There is danger there that smothering may produce losses or poor shape. Good results can, however, be obtained by careful selection of ground.

There has been a great increase in the use of floating trays for rearing separate spat and it is expected to continue. This, combined with the increased use of the shores of sheltered creeks for rearing small oysters during open water, has created a need for the leasing of sheltered creeks. It is desirable to assure oyster farmers that they will be able to use the same mooring grounds or shores from year to year so that they can make economical arrangements for the work. It has, therefore, become the policy of the department to issue leases in sheltered creeks but to avoid monopoly of the rather limited area where conditions are suitable leases in these situations are being issued for a term of five years only.

There has been a great increase in the use of concrete-coated egg-case fillers for the collection of spat in the Malpeque-Cascumpeque region. In 1938 about 98,000 of these collectors were used by oyster farmers as compared with about 55,000 in 1937. This is concrete evidence of a fundamental increase in production by the industry. A further increase is expected associated with increased rearing both on trays and on natural bottoms. The latter uses great quantities of spat to allow for losses. The Malpeque-Cascumpeque region is now the principal source of stock for the re-establishment of the industry in areas affected by the oyster mortality and this is another factor which will tend to increase spat collection.

In 1938 the Fisheries Research Board, in co-operation with the department, made predictions of the settlement of oyster spat in several areas. Accurate knowledge of the time when spat settles increases the efficiency of spat collection a great deal. It is expected that the prediction of "sets" will be continued from year to year and extended to new areas. It is hoped that in this way profitable spat collection will be established in areas not now used for that purpose.

A bounty was paid on starfish again in 1938 as a continuation of the 1937 experiment. As the rate of twenty-five cents per gallon paid in 1937 did not appear adequate it was increased in 1938 to fifty cents per gallon. This led to a great increase in the mopping of starfish and the amount originally set aside for this purpose was quickly exhausted.

TABLE III.—PRODUCTION OF OYSTERS IN THE MALPEQUE-CASCUMPEQUE REGION

Year	From the Depart- ment's Areas	From Private Areas	Total
	bbls.	bbls.	bbls.
1933.....	327	181	508
1934.....	422	434	856
1935.....	332	979	1,311
1936.....	454	1,093	1,547
1937.....	401	1,948	2,349
1938.....	437	3,451	3,888

The bounty was paid on 1,705 gallons, containing probably over a million and a half starfish. The bounty has served a useful educational purpose in demonstrating to the industry the effectiveness of mopping.

Starfish remain one of the most serious obstacles to oyster farming in this region and continued effort is needed on the part of the industry to combat them. As mentioned below, it is possible that the use of quicklime may provide a more effective substitute for mopping.

3. *Mortality of Oysters*.—The continuation of the mortality of oysters in various areas in Prince Edward Island is a very serious feature for the whole oyster industry. There has been no recurrence of the mortality in the Malpeque-Cascumpeque region where a very serious mortality occurred years ago. There is, however, constant danger of spread of the mortality to new localities. In Prince Edward Island, Bedeque bay is the only considerable oyster producing area in which the mortality is not known to have occurred and it may have been there at about the same time as in the Malpeque region. The mortality may not be confined in the future to Prince Edward Island and if carried to the mainland may destroy the existing oyster industry in Nova Scotia and New Brunswick.

A similar mortality destroyed the oyster industry in the Malpeque-Cascumpeque region commencing in 1915 and spreading progressively throughout that region for a number of years. The present mortality was first noticed in Hillsborough (East) river and in certain neighbouring north shore bays in 1936 although it possibly occurred on a small scale in 1935. Hillsborough river, formerly supporting a public fishery of some thousands of barrels, produced no commercial catches in 1936. The mortality was of the same order in Brackley bay and occurred also in Tracadie, Savage and Rustico bays. In 1937 it destroyed most of the oysters in Elliott (West) and York (North) rivers, tributaries of Charlottetown harbour not seriously affected in 1936. In Pownal bay and in Vernon, Orwell and Pinette rivers the mortality appeared late in 1937 and reached varying proportions estimated at from 10 to 35 per cent. In 1938 the mortality continued in the Charlottetown region and, as predicted in the annual report of the department for 1937, completed the destruction of the fishery in tributaries of Hillsborough bay.

The mortality has made its appearance in some other areas in the province of less importance. There is evidence that it occurred in Enmore and Percival rivers in 1933. It will probably be introduced into all oyster areas in Prince Edward Island.

No causative micro-organism or "germ" has been found to which the mortality can definitely be attributed. The manner in which the mortality has spread is, however, conclusive evidence that it is caused by a contagious disease affecting oysters. Both in the Malpeque-Cascumpeque region and in the Charlottetown region an epidemic occurred which spread progressively for a number of years in which there were no apparent unusual conditions.

In 1938 there has been further evidence of the resistance of the present Malpeque stock to the disease. No serious mortality has occurred in the Malpeque-Cascumpeque region for twelve years or more. Oysters introduced into that region in 1928 and 1929, however, died with the usual symptoms of the mortality in the summer following their introduction. Malpeque stock in the immediate vicinity was not affected. Malpeque oysters transferred to Brackley bay in 1937 have survived to date and grown well although the mortality has continued there among the native oysters. Malpeque oysters introduced early in 1938 into a tributary of Hillsborough bay were not affected that summer. Malpeque spat were reared on trays in Enmore river in 1938 with spat produced in Enmore river. Although the latter showed a serious mortality with the usual symptoms the Malpeque spat were unaffected and grew more rapidly. Other minor experiments have confirmed these results.

It appears, then, that all of these mortalities have probably been caused by the same disease. Each new appearance of the disease can be explained by a known transfer of gear or oysters from an area where the disease was known to have occurred to the newly affected area. In each case the mortality has been associated with the same symptoms and occurred at the same time of year with its peak in the late summer or early autumn. The present Malpeque stock, which is bred from the few survivors of the mortality over twenty years ago, is apparently resistant to the disease.

The above considerations are very important in determining the most promising policy. Because the Malpeque stock is apparently resistant there is some prospect of re-establishing oyster stocks in the affected areas by the introduction of oysters from the Malpeque area. Because the disease is apparently easily transferred from place to place it is unwise to build up local oyster farming industries with limited stocks which have not been exposed to the disease. There would always be danger of the introduction of the disease which might destroy the results of a great deal of effort. It seems, therefore, the best policy to use Malpeque stock in developing oyster farming in new areas and in attempts to re-establish the industry in areas affected by the disease. In Bedeque bay only, where large stocks are now present which may be susceptible to the disease, does it seem wise to prohibit the introduction of Malpeque oysters.

The development in Malpeque bay is thus given a special importance. It provides the only sound prospect for development elsewhere in the province. This has been noted above in connection with spat collection. If the disease should appear in Nova Scotia or New Brunswick the Prince Edward Island oyster industry will in the same way be of importance to the whole Maritime industry as a source of resistant stock.

4. *Bedeque Bay*.—In 1936 the Department of Pensions and National Health conducted examinations leading to the conclusion that Bedeque bay inside Indian and Phelan points (Summerside harbour) is so contaminated as to make oysters unsafe to use as a raw food. This area was, therefore, closed to direct marketing of oysters early in 1937. Grounds for the re-laying of oysters for purification were sought in neighbouring coves.

Salutation, Sedgewick and Sunbury coves offered some suitable grounds but a decision regarding their freedom from pollution was not received from the Department of Pensions and National Health until late in the summer. Time was, therefore, too short to complete all of the many applications for leases in time for the autumn fishing season. Many areas were surveyed, however, and over 1,900 barrels of oysters from the polluted part of Bedeque bay were planted on them as shown in Table I.

In 1938 regulations were altered to provide for a more satisfactory policy in re-laying oysters for purification in this region. An attempt was made to assure proper purification of the polluted oysters and to conserve the producing stock in the polluted area. Although developed for this region the same principles are applicable elsewhere where pollution occurs.

The picking of small oysters in shallow areas exposed to winter mortality was permitted in June only. The season for this was separated from that for the fishing of marketable oysters in order to make possible the prevention of fishing small oysters from deeper grounds. The danger of picked oysters being marketed directly is less than in the case of oysters of marketable size so that June seemed a suitable month for this purpose although the marketing of oysters from leased areas is permissible then.

The fishing of oysters of marketable size in the polluted area for re-laying was permitted in July when marketing is illegal even from leased areas. All oysters taken from the polluted area were to be re-laid on approved grounds. The July season for re-laying assures that the oysters will be on grounds approved for purification for at least the whole month of August. The re-laid oysters can then be marketed from the first of September.

Such a policy of controlled relaying for purification is necessary to supply the outlet for oysters growing in areas closed to direct marketing on account of pollution. The only alternative would be the removal of the source of pollution by sewage disposal. To do this satisfactorily would be so expensive that it would seldom be warranted economically in the case of a town as large as Summerside.

The leasing of oyster grounds in this region and the operations in 1938 are summarized in Table I. The re-laying met with varied success. Re-laying on tidal flats in Salutation cove produced good survival and rapid growth but marketing or transfer to deeper ground is necessary for winter. The re-laying on deeper grounds met with good success in many cases. In some instances losses were caused by shifting of bottom, by damage of oysters during the transfer, by failure to separate clusters and other deficiencies in methods. It is expected that experience both in the nature of the re-laying grounds and in methods of handling will lead to the development of more satisfactory re-laying.

5. *Experimental Farming.*—The Department of Fisheries in 1938 continued experimental farming in close co-operation with the Fisheries Research Board. The scientific investigation by the board have been designed to develop oyster culture methods and to provide a sound basis of knowledge for the administration and development of the industry. The department has carried out larger scale trials on methods based on scientific investigations.

The great development of oyster farming is shown elsewhere in this report and the industry is still expanding. Our knowledge of the oysters and the conditions affecting their growth and reproduction must be made to keep pace with the growing and changing industry. The development and demonstration of further improvements on oyster culture methods must be continued and these are the aims of the experimental farming.

The industry has shown to a high degree the co-operation necessary to make the results of this work successful. It has shown an eagerness to try out new methods and enterprising oyster farmers have developed improvements in application and in practical technique.

Headquarters for all experimental oyster farming by the department and the board are maintained at Ellerslie where areas have been set aside for that purpose on a tributary of Malpeque Bay and where the board has established the Prince Edward Island Biological Station. The special needs of other localities are, however, borne in mind. Many of the results obtained at this central experimental farm are applicable elsewhere with minor variations but investigations, demonstrations or operations for the provision of stock are carried out elsewhere to meet special local needs. Thus, in 1938 intensive investigations were continued at Orangedale and at Malagash, Nova Scotia, where a general attack is being made on the special problems of the Bras d'Or lakes and the Gulf of St. Lawrence coast of Nova Scotia (see below). Investigations and experiments were carried on in the Charlottetown region in connection with the oyster mortality. It is pointed out, however, that the extension of intensive work to outlying areas is limited by the expense and by the availability of trained personnel necessary for proper supervision.

6. *Results of Investigations and Experiments.*—The results of experiments to develop improvements in oyster culture methods are reported in detail elsewhere. Space permits only a brief mention of the salient features of this work in 1938.

The prediction of "sets" has been mentioned above. With the assistance of two permanent seasonal inspectors it was possible to obtain in many places temperature observations, samples of oysters to observe spawning and tows with No. 18 bolting silk nets to obtain larvae. On this basis predictions of "sets" were made in fourteen places in the Malpeque-Casumpeque and Bedeque regions. This work in 1938 extended our knowledge of the occurrence of oyster larvae. It confirmed the reliability of the information on growth of larvae which was used as a basis for the predictions and which had been developed in its final form by Dr. J. C. Medcof in 1937. It is expected that this important work will be expanded in the future.

Experiments in 1938 showed that "sets" of spat increased with depth down to at least twelve feet and clearly demonstrated the reduction of "sets" on clusters which are severely crowded. It, therefore, appears advisable to reduce crowding by suspending the bundles of collectors in more than one tier whenever practicable. The angle at which collectors were suspended with relation to the position of the float had no evident effect on the "set."

Experience in 1938 indicated that floating trays with board bottoms and wire ends were not quite as satisfactory as wire-bottomed trays for the rearing of oysters. Spat grew satisfactorily in the board-bottomed trays when small but as they became larger and more crowded the growth became uneven and slower than in wire-bottomed trays. This was apparently especially true where the currents were very weak.

Investigations were continued on the seasons and depths at which shipworms settle and on the protection of wood. Continued experience with its use indicated that, while the mixture of tar-copper oleate and a solvent gives satisfactory protection if a thick coat is maintained over the entire surface, its durability is less than white or copper paint. It has shown itself sufficiently good to warrant continued use as a cheap preservative but it is planned to experiment with the addition of other ingredients to improve the durability.

Preliminary experiments in the use of quicklime for killing starfish confirmed reports of United States investigators that it is effective at a concentration of 480 pounds per acre. In shallow tanks this concentration killed about 90 per cent of the starfish in the first five days, after which the lime appeared to be no longer harmful. Oysters, lobsters, crabs, shrimps, cunners and various other species showed no serious ill effects. Small flounders were killed. Further experiments are planned to determine the effect of operations on a commercial scale on animals and plants which might be of direct or indirect value.

7. Provision of Planting Stock.—In 1938 sales of 193 barrels of small oysters were made to lessees for stocking purposes. The demand has been so great that the department is unable to satisfy any considerable proportion of it. The policy has, therefore, been adopted of limiting the sale of planting stock to any individual or group to ten barrels. This increases the usefulness of the oysters the department can supply in enabling those entering the industry to make experimental plantings.

During the year 3,368 cardboard spat collectors bearing spat were sold. The sales by the department now constitute a very small proportion of the production. It seems desirable, however, to continue the production of limited quantities of spat for sale in order to assure at least a limited supply for outside areas and for those just entering the industry.

The policy of issuing permits to lessees to pick oysters for stocking purposes in the shallow shore zone where winter mortality is high was continued in 1938. This policy has led to the transfer of large quantities of oysters into deeper water thereby saving them from the winter killing which might otherwise have destroyed a large proportion. Its relative importance as a source of planting stock is, however, continually decreasing. The large numbers of leased areas and of those interested in picking are making proper supervision a difficult problem. This is especially true in warm weather when picking by hand is possible at a considerable depth. To improve the situation in this regard a change of the season for picking from the summer to the autumn is under consideration. This would also have the advantage of saving some oysters too small to pick during the summer but growing to a considerable size by the late autumn.

8. Revenue.—Table IV summarizes the revenue from experimental farming and provision of planting stock in 1938. All of this revenue is from the Malpeque-Cascumpeque region except for \$8.40 from the sale of collectors bearing spat at Orangedale and \$57.32 from the sale of oysters which had been transferred from the Bras d'Or lakes to St. Anne bay (see below).

In addition to the sales of small oysters and spat mentioned above marketable oysters produced in the experiments or demonstrations are sold. In 1938 the department sold 437½ barrels of marketable oysters at an average price of \$9.14 as compared with 400·7 at an average price of \$8.40 per barrel in 1937. The total revenue from oyster culture operations, exclusive of rentals on leased areas and royalties, was \$5,199 in 1938. The addition of rentals and royalties makes the total revenue from the department's oyster culture operations in 1938 \$6,957.27, of which all but \$65.72 was from Prince Edward Island.

TABLE IV.—REVENUE FROM OYSTER CULTURE, 1938-39

	1938-39	1937-38
	\$ cts.	\$ cts.
Sale of 3,368 cardboard spat collectors bearing spat at \$0.15.....	505 20	246 00
Sale of 3,464 cardboard spat collectors bearing spat at \$0.05.....		178 20
Sale of wire containers for spat collection.....	36 20	36 80
Sale of 42 bbls. crooked oysters for planting at \$3.00.....		126 00
Sale of 193 bbls. small oysters for planting at \$3.00.....	579 00	
Sale of 169 barrels small oysters for planting at \$2.50.....		422 50
Sale of market oysters from experimental farm:		
150 bbls. ordinary at \$7.50 (7.00 in 1937-38).....	1,125 00	1,432 90
55 bbls. ordinary at \$7.00.....	385 00	
53 bbls. medium at \$10.00 (9.00 in 1937-38).....	530 00	531 00
74 bbls. medium at \$9.00 (9.25 in 1937-38).....	666 00	434 75
500 bbls. select at \$12.50 (11.05 in 1937-38).....	625 00	994 50
55½ bbls. select at \$12.05.....	668 78	
Sale of 13 bbls. oysters from St. Ann bay, N.S.....	57 32	
Rent of starfish mops.....		2 00
Fees for resurvey of boundaries of leases.....	21 50	9 00
Royalty on oysters taken from leases in 1937.....	13 45	
Rentals on leases.....	1,744 82	753 31
Total.....	6,957 27	5,166 96

Field Day for the Prince Edward Island Oyster Growers Association.—For the third consecutive year a field day was held at the Biological Station at Ellerslie on August 10 in co-operation with the Prince Edward Island Oyster Growers Association. In spite of heavy rain up to the middle of the day there was a large attendance. Great interest was again shown in exhibits illustrating various aspects of the industry.

The marketing of oysters was specially featured. The association was fortunate in having an address from F. W. Walsh, of the Marketing Board of the Province of Nova Scotia, on marketing and its relation to grading and to organization of producers.

The field day appears still to be effective in creating interest in oyster culture and disseminating information. A repetition is planned by the association in 1939.

The Prince Edward Island Oyster Growers Association has continued to be of great assistance in expressing collective opinions on behalf of the industry.

B. NOVA SCOTIA

The present oyster areas of Nova Scotia fall naturally into two distinct divisions—the Bras d'Or lakes of Cape Breton and the Gulf of St. Lawrence coast. Oysters might possibly be grown elsewhere but prospects for profitable oyster culture are believed to be much better in these two regions than anywhere else in the province.

The conditions in the two regions are widely different from each other and from those of the north shore bays of Prince Edward Island where investigations have been centred in the past. There has been very little effort to cultivate

oysters anywhere in Nova Scotia and there is little experience on which to base plans for future development. Intensive investigations are, therefore, still necessary to adapt cultural methods to special conditions in the two regions.

As the agreement between the Dominion Government and the government of Nova Scotia was not completed until 1936 the present oyster culture program is still in a very early stage of development in the province. There has as yet been hardly any establishment of actual private oyster farming.

1. *Bras d'Or Lakes.*—A preliminary survey of the oyster areas of the Bras d'Or lakes was made in 1934 and some minor supplementary investigations were carried on in 1935. Intensive investigations were commenced in 1936 and are still in progress. Dr. J. C. Madcof, a scientist appointed to the staff of the Fisheries Research Board in 1938, was occupied with investigations in this region during that year.

The work in 1938 was concerned with the special problems of the region regarding both production and marketing. Ground was also offered for lease in February, 1938, and the consideration of applications involved a great deal of work.

The general prospects for profitable oyster culture in the Bras d'Or lakes are not very good unless the marketing of oysters from that region can be improved. The difficulties of the situation are given in greater detail below.

Problems of Production.—Spat collection with the methods developed in the Malpeque Bay area was successful in 1938 for the third consecutive year. Experiments in 1938 included the use of brush as well as of concrete-coated card-board collectors with good results. The region abounds in well-sheltered inlets where conditions appear excellent for spat production and this fundamental step in the production of oysters appears to offer little difficulty.

The rearing of small oysters is, however, not so satisfactory. Relatively slow growth occurred again in floating trays. On trays near the bottom in deeper water growth was somewhat better but still much slower than in the Malpeque Bay region, for example. In view of these results and of the natural production of small oysters the value of intensive rearing in this region seems very doubtful.

There is a considerable natural production of small oysters in very shallow water along the shore, much of which results from the settlement of spat on eel-grass. These oysters grew as well or better than on the experimental trays. They can be exploited as a source of planting stock by a policy of issuing permits for picking oysters for planting purposes similar to that which has given good results in the Malpeque-Casumpeque region. Both survival and eventual quality might be improved if these oysters were planted on suitable grounds. The development of a policy of this kind is under consideration for 1939.

Observations suggest that a relatively scarce food supply is an important factor in making growth slow in this region. Microscopic plants are not present in as great abundance as in many other regions. This is evident not only from examination of samples taken for that purpose but also in the clearness of the water and the relatively slight fouling of surfaces. The latter may be responsible for the unusual numbers of spat attaching themselves to eel-grass. If a poor food supply is responsible for the slow growth in the region no practical solution of the difficulty can be expected.

The relatively slow growth of oysters in the Bras d'Or lakes is an adverse factor of some importance. It tends to make production slow and to reduce the production per acre. This reduces the intensity of fishing which areas in the region can support without depletion.

Problems of Marketing.—The most serious and immediate problem of the industry is to improve marketing rather than production. The oysters now realize low prices and command only an uncertain market. This is discouraging

to the development of oyster farming. At the present time the oysters are all shipped in the shell and the difficulties will be aggravated by increased production of high quality shell oysters elsewhere. General improvement will be possible only if quality can be improved or if other outlets can be developed to provide a more reliable market.

The poor quality of the oysters of this region consists in their freshness, their relatively weak shells and the darkness of the edge of the mantle. The two former are apparently associated with the low salinities. The weakness of the shell creates difficulties in shipment and no method of improving the oysters in this regard is in prospect. The freshness and the dark mantle both make the oysters less acceptable to the Canadian shell trade. They may possibly be overcome by transfer to saltier waters.

A preliminary trial transfer of oysters from near Orangedale to Port Hood island in 1935 gave promising results and a transfer on a larger scale was made in 1937 to St. Ann harbour where the water is as salty as in areas producing oysters of the highest quality. In the latter experiment the saltiness was improved quickly and there was some reduction in the darkness of the mantle edge after the oysters had remained on the new grounds for about a year.

The only real proof of the value of such a transfer would be a demonstrated increase in the market value of the oysters. In 1938 trial shipments to the Montreal market were made in co-operation with the Nova Scotia Marketing Board and the Bluemantle Oyster Producers Association at Orangedale. The results were indecisive but slightly higher prices were obtained and a somewhat better reception observed than in the case of oysters marketed directly from the Orangedale vicinity.

Some improvement in the marketing of Bras d'Or Lakes oysters may be produced by better grading. In common with most of the Canadian oyster industry there is much room for improvement in this regard. By careful grading and packing the Bluemantle Oyster Producers Association was able to obtain prices above the average for the region. While an effort should be made in this direction it is not believed that it will be sufficient by itself to remove the marketing difficulties of the Bras d'Or Lakes oyster industry.

The possibility of developing other outlets should be considered more carefully than in the past. The profitable shipment of shelled oysters or of canned oysters both depend on a low price before preparation. Prices are already low in the Bras d'Or lakes and while such outlets might not increase the prices obtainable for oysters in the shell it would in itself be desirable to develop reliable outlets.

Leasing of Oyster Ground.—The region now supports a public fishery concentrated in the vicinity of Denys basin and the western part of St. Patrick channel. Scattered through the same area, which presents the best prospects for the industry, are a number of leases formerly issued by the Provincial government. Although conditions for intensive oyster farming are not very encouraging it can probably both increase the production and improve the average quality. It is only through oyster farming that any sustained expansion of the industry can be made if the marketing difficulties are overcome.

In the autumn of 1936 a visit was made to the Bras d'Or lakes by the writer in company with Chief Supervisor Sutherland and Dr. M. Cumming, representing the provincial government, to formulate a policy for the region. On the basis of findings at that time and the results of previous investigations, the leasing of grounds was advocated to encourage the production of good quality oysters and it was proposed that certain areas should be set aside which would not be leased so that the interests of the public fishery would be protected. It was realized that oysters occur so generally in the Bras d'Or lakes that it would be impossible to encourage oyster culture without leasing grounds on which some oysters are present. To enable this the agreement between the two gov-

ernments was amended slightly in the autumn of 1937. In February, 1938, it was advertised that applications for leases would be considered. Areas have been set aside which are not to be leased, selected to include grounds suitable for the public fishery. As improvement of quality is so important the policy has been adopted of leasing only areas including suitably firm bottom. In order to assure as many as possible an opportunity of engaging in oyster farming the area of an individual lease has been limited to three acres. Most of the suitable grounds occur in the shore zone and no lease is permitted to extend more than 1,200 feet along the shore.

Up to the end of the fiscal year 1938-39 over 105 applications have been received in this region and about 28 of these have been examined and approved. There are in addition about 29 leases issued by the provincial government and still in force.

The development of details of policy and lack of personnel has delayed action on many applications but it is expected that better progress will be made next year as additional assistance has now been provided for this purpose.

2. Gulf of St. Lawrence Coast.—A preliminary survey of this region was made in 1936 and intensive investigations of the special problems were commenced in 1937 in the Wallace-Tatamagouche area which is the most important producing area of the region and offers typical conditions for study. These investigations have been continued in 1938 and are still in progress. Further general survey of conditions in other parts of the region is required and will be carried out as opportunity permits. The region as a whole produces a smaller quantity but higher quality of oysters than the Bras d'Or Lakes region. Its problems, therefore, concern production rather than marketing. It differs both from the Bras d'Or lakes and the north coast of Prince Edward Island in its large tides and in the number of large streams tributary to oyster producing inlets. The large tides make tidal flats of great importance both in the natural production and in the potentialities of the region for oyster culture.

Investigations in 1938.—Facilities for investigations were improved at Malagash in 1938. A small lot of land was purchased and a small building erected to house equipment. A permanent foreman was also appointed.

Only moderate success was achieved in spat collection. "Sets" on experimental collectors on floats in a branch of Wallace bay were not heavy. Collectors exposed on the flats at Malagash obtained an original "set" of commercial value but the survival was poor, owing in part at least to shifting of the bottom and temporary burial of collectors. It is hoped that the provision of good shelter inside the dyke mentioned below will overcome this difficulty.

Experiments were continued in the use of tidal flats for oyster culture. A dyke was constructed in 1937 of boards nailed to uprights driven into the bottom and banked on either side with mud, gravel and stone. It retained up to eighteen inches of water over about half an acre. The dyke survived the winter of 1937-38 without serious damage.

Experimental plantings of oysters were made inside the dyke and at various levels along the flats outside. Losses of from five to ten per cent, attributable in part at least to damage before planting, occurred on mud flats both outside and inside the dyke. Much higher mortalities occurred on firm bars exposed at low tide. Survival on ground exposed at low tide is apparently poorer on hard than on soft bottoms. There was a better survival on level than on sloping bottom and a better survival on firm bottom inside the dyke than on firm bottom at the same level outside. These results suggest that the retention of very shallow water reduces winter mortality. The effective use of the dyke for the retention of oysters over winter remains, however, to be demonstrated.

Other possible advantages of retaining water in such a dyke were indicated by the investigations in 1938. The growth inside the dyke was relatively rapid.

When the additional shelter of a boom was provided little or no shifting occurred on bottom within the dyke. The rapid growth and protection from shifting are promising for the rearing of small oysters. As mentioned above, the dyke may prove of value in the collection of spat. The good shelter would make it possible to expose collectors on hardened bottom within the dyke without wrapping in wire netting. If worth while "sets" can be obtained in this manner a cheaper method of spat production than the exposure of cardboard collectors by suspending them in bundles from floats will be assured.

There is, at the present time, a great natural production of spat and small oysters on bars exposed at low tide in Malagash basin. If left on the bars heavy losses occur and the remaining oysters become clustered and of poor shape. These bars do, however, provide a great potential source of planting stock and an experimental transfer of such oysters was made in 1937 and in 1938 to firm sandy bottom outside Malagash basin at depths sufficient to escape ice. The transferred oysters have survived well and it is believed that high quality oysters could be matured in this way. It is proposed to adopt a policy of issuing permits to oyster farmers to pick oysters on the bars for planting. Oysters occur in similar situations in other parts of the region and may be exploited in the same way.

Leasing on the Gulf of St. Lawrence Coast.—Since ground was offered for lease in February, 1938, about 27 applications have been received in this region. Of these about 16 have been examined and approved.

In this region no leases are being issued of areas now producing oysters in commercial quantities. Some applications have been refused on this basis at Caribou harbour, Malagash basin and Wallace bay and river. The definition of the areas which can be properly considered to be producing oysters in commercial quantities has involved delay in action on other applications.

The areas for which applications have been received in this region vary greatly in nature but most of those which are being proceeded with include ground deep enough to escape ice. There appears to be a good prospect for the development of such areas in this region. It will depend, however, on the development of spat collection and rearing methods and, especially in the immediate future, on the adoption of administrative policies exploiting the natural production of small oysters in situations where they do not lead to commercial production without transfer.

C. NEW BRUNSWICK

In view of unsatisfactory conditions in Shediac bay as regards public health no further work was done there in 1938. The work by the Biological Board and the Department of Fisheries in this area in 1932 and 1933 has served to bring some of the special problems to light, especially the erratic local production of spat and to provide a basis for further attack on them when conditions permit development there. The exploitation of the oysters requires the discovery of suitably situated unpolluted areas on which oysters could be relaid for purification or on which planting stock obtained in Shediac bay could be matured. Shediac bay is the only New Brunswick area over which the Dominion has jurisdiction on the basis of an agreement similar to those with the provinces of Prince Edward Island and Nova Scotia.

D. GENERAL

1. *Inspection and Marketing.*—The importance of improving the grading of oysters to the development of the Canadian oyster industry can hardly be overestimated. Hitherto there have been no recognized grades with any uniformity from place to place. Very few of the producers or dealers have attempted systematic grading and even in the best cases there is room for improvement.

Thorough and stable grading is essential to the improvement of marketing and the establishment of stable prices. The need for effort in this direction will increase as the development of oyster farming leads to an increased production.

In 1938 with the co-operation of the Prince Edward Island Oyster Growers Association a first grade called "No. 1 Select Cup-Shaped" was defined and regulations have been passed providing for inspection by the department's officers of oysters voluntarily submitted for qualification for this grade. Only those oysters which conform to the definition of the grade can be labelled as "No. 1 Select Cup-Shaped."

Oysters of this grade are defined as: (a) "No. 1 Select Cup-Shaped" oysters are oysters the length of each of which shall not exceed one and one-half times its greatest width; provided that any barrel, half-barrel or box of such oysters may contain not more than ten per cent of oysters, the length of each of which may be up to one and three-quarter times its total width, but in neither case shall the length be less than three inches across the widest diameter of the shell. (b) No barrel, half-barrel or box of oysters shall be marked "No. 1 Select Cup-Shaped" unless it is marked with the minimum number of oysters contained therein and until it has been inspected by a properly authorized inspector and found by him to comply with paragraph (a) of this section. Such officer shall then mark the container with the words "No. 1 Select Cup-Shaped, Inspected for Grade."

Similar provision for one or more inferior grades is under consideration. It is to be hoped that the industry will take full advantage of this endeavour to establish standard grades.

2. *Public Health.*—The relation between the oyster industry and public health is worthy of general attention because of its great importance to administrative policy and to operations by oyster producers.

Public health supervision of all food industries is a policy of long standing in our society. In the case of the oyster industry it is necessary in order to protect not only the public health but the industry itself. Experience in other countries has shown that outbreaks of typhoid or other diseases if attributed to oysters have a disastrous effect on the market. It thus becomes necessary to decide what areas are so dangerously polluted that the oysters in them cannot safely be used and to prevent the direct marketing of such oysters without purification.

In Canada decisions regarding the pollution of areas are made by the Department of Pensions and National Health. The standards on which areas are classified as dangerously polluted or not have been based to a large extent on those in use in the United States. A decision in each individual case is based on a survey of sources of pollution and on actual bacteriological examination of the waters under consideration. It should be understood that pollution represents a potential as well as an actual danger. It provides a means for the spread of diseases if they should occur in the communities from which the pollution comes.

After the Department of Pensions and National Health has decided that any area is dangerously polluted the prevention of the direct marketing of oysters from that area and the supervision of the re-laying of oysters for purification is carried out by the Department of Fisheries. The oysters must, of course, be re-laid on areas approved by the Department of Pensions and National Health and for a period which that department regards as sufficient.

The proper public health supervision of the oyster industry has only been attempted of recent years and adequate supervision is still in the course of development. This causes unavoidable difficulties as it has not yet been possible to carry out the necessary investigations in all our oyster areas. Further deci-

sions are, therefore, to be expected and may seriously affect the industry. The situation will be improved when the ground has been covered more adequately and more thorough knowledge of the dangerously polluted areas is available.

In the meantime, vigilance is necessary to avoid as much as possible economic losses which may be caused by the exploitation of areas which may later be found to be dangerously polluted. In many cases it might be economically possible to purify the oysters by relaying in relatively pure waters. In other cases the added expense might be too much for profitable operations. Vigilance is also required on the part of all concerned to prevent increases in pollution. These might in some cases even accompany the development of the industry itself. It must be understood that if pollution increases new areas may at any time become dangerously polluted.

The difficulties of the public health supervision of the oyster industry are great but are not insoluble. They can be overcome with the least damage to the industry only by the fullest possible co-operation between the two departments and the industry itself.

APPENDIX No. 5

REPORT OF INSPECTION OF FISH AND PACKAGES AND
TECHNICAL INSTRUCTION TO FISHERMENBy J. J. COWIE, *Director*

INSPECTION OF SALTED HERRING, MACKEREL, ETC.

This inspection is conducted under authority of the Fish Inspection Act. During the year under review inspections of fish and containers were performed by those of our regular fishery officers who are qualified and authorized to do so with the assistance of three qualified temporaries.

Atlantic Coast

During the year 1938 over 6,000 inspections were made of fish-curing places and curing utensils with a view to seeing that curing operations were carried on under proper sanitary conditions.

There were, in round figures, 311,000 empty containers inspected and marked during the year. Of that number 900 were reconditioned and 10,000 rejected for use as fish barrels. Of fish packed in containers for market there were inspected 11,000 containers of alewives, 39,000 of herring, 800 of headless herring, and also 54,000 containers of mackerel and 8,000 of mackerel fillets. There were 221,000 boxes of smoked round herring inspected. Of oysters there were 23,000 containers inspected.

In September, 1937, an Order in Council was passed providing for the inspection of frozen smelts in the counties of Gloucester and Restigouche, New Brunswick. The result of the inspection was such that at the end of the season there was a call for the extension of the inspection system to the whole province of New Brunswick. Authority was therefore procured in 1938 to apply the inspection to the whole province. A number of specially qualified temporary inspectors were employed during the winter fishing season to carry out the extended inspection. Last year there were inspected 7,000 boxes, whereas this year 160,000 were inspected.

Under an arrangement with the Department of Pensions and National Health our fishery officers in the western part of Nova Scotia supervised the shucking, packing and shipment of scallops.

Pacific Coast

Those of the officers on the Pacific Coast who are qualified and authorized to do so carried on the inspection of dry salted herring during the winter herring fishing season. The fish are packed in 400-pound boxes and after inspection are shipped to the Orient. With the existing conditions in the Far East the business in this commodity remains limited. The quantity packed for this trade during the year under review was 149,700 hundredweights.

INSPECTION OF CANNERIES AND CANNED FISH

An inspection of all fish and shellfish canneries and the process of canning is conducted under the Meat and Canned Food Act by the fishery officers who are qualified.

During the year there were operated in Nova Scotia, New Brunswick, Prince Edward Island and the Magdalen Islands 213 lobster canneries, 21 clam canneries and 10 other canneries where sardines and other fish are canned.

Particular attention was given to the weight of lobster meat packed in the cans. Two hundred and eighty-one cases of lobsters were marked "Underweight."

During the year all lobster canneries were graded in accordance with the grading scheme. A great improvement generally is noticeable in the standard of canneries operating, which is reflected in the production of better-quality pack.

Pacific Coast

On the Pacific Coast, as on the Atlantic Coast, qualified fishery officers inspected all fish and shellfish canneries and reported regularly during the season on the sanitary condition of such. During the year there were operated 38 salmon canneries, 4 clam canneries and 2 other fish canneries.

An inspection of all salmon canned in British Columbia is carried on at Vancouver by a staff consisting of a chief chemist and two laboratory assistants. The inspection is conducted at a laboratory equipped and maintained by the department for that purpose. During the year the total number of cases of canned salmon inspected was 1,651,863. Of that number 32,204 cases were found to be below the standard and were marked "Grade B." A fee at the rate of one-half cent a case is charged for this inspection; consequently, the industry practically pays for this service.

INSTRUCTION IN FISH CURING

Atlantic Coast

Instruction to fishermen in the curing of cod in pickle for making boneless fish and in the curing of cod in the Gaspe style was continued during the year.

Cod Curing in Pickle.—The work of instruction in pickle curing was carried on in Nova Scotia, Prince Edward Island and on the north shore of New Brunswick.

It has to be particularly noted that as a result of this work a firm at Petit Rocher, Gloucester county, New Brunswick, has developed this business to such an extent that there were twelve to fifteen fairly large boats operating where previously no fishing was carried on.

Gaspé Cod Curing.—Instruction in this style of curing was continued at the Magdalen Islands and the county of Gloucester, New Brunswick.

The instructors visited the beaches and landing places and demonstrated to the fishermen the proper method of splitting, washing and salting the fish. The drying was also supervised as well as the packing and grading of the fish for market.

EDUCATIONAL COURSES FOR FISHERMEN

The fisheries Research Board arranged to give a short course of instruction to fishermen at the Atlantic Fisheries Experimental station, Halifax, Nova Scotia. The period of the course was from April 1 to 21, 1938. Twenty-five fishermen attended. These were drawn from New Brunswick, Prince Edward Island and Nova Scotia. The instruction was mainly of a practical nature and consisted of instruction in the preparation of pickle-cured and boneless cod, the preparation of pickled mackerel and herring, navigation and motor engines.

The practical demonstrations were supplemented by lectures designed to give the fishermen an idea of the underlying principles of the practical procedures. Lectures also were given dealing with the habits of fish in the sea in relation to its capture.

Those who gave instruction were: Science, Doctors Beatty, Hess, Johnston and Mr. R. A. McKenzie, of the Research Board's staff; the curing of herring and mackerel, Mr. Robert Gray, of the department; pickle-cured cod and boneless fish, Mr. George Earl (since deceased) of the department; navigation, Captain O'Hara, of the School of Navigation, Halifax; motor engines, Mr. R. H. Davison, of Halifax.

The board also arranged to conduct a course of instruction for fishermen at its Fisheries Experimental station at Grand river on the Gaspé coast in the spring of 1938. This course ran from May 4 to 28. Twenty-one fishermen attended the course. These came mostly from the Gaspé coast and some from the French-speaking districts of New Brunswick.

The instruction given was similar to that given at Halifax—the curing of mackerel and herring and the pickle-curing of cod and the making of boneless fish. Instruction was also given in navigation and in the operation of motor engines and the smoking of fish. Lectures were given on marine biology, refrigeration and the use of by-products, also in bacteriology in relation to canning.

APPENDIX No. 6

REPORT ON CANNED SALMON INSPECTION AND RESEARCH

By F. CHARNLEY,

Chief Chemist, Canned Salmon Inspection Laboratory, Department of Fisheries

During 1938 the work of the Canned Salmon Inspection Laboratory has been continued along the lines indicated in the two previous annual reports. The routine inspection of parcels of canned salmon submitted for examination and tabulation of the resulting data have furnished additional data regarding the quality of British Columbia canned salmon. The results derived from the 1937 examinations are now complete and, together with those of the 1936 season, provide the first two sets in the collection of annual data required for a study of the annual variation in quality in British Columbia canned salmon.

With the exception of minor changes in procedure, no substantial alterations have been made during 1938 in the method of carrying out the routine examinations. This apparent lack of progress in the routine work of the laboratory, however, is in sharp contrast with the rapid advances that have been made in certain of the investigations that have been carried out at the laboratory during the past year. The successful determination of the firmness research, for example, has provided a scientifically sound scale of firmness for canned salmon which greatly increases the value of this character, since it will now be possible to combine this characteristic effectively with other fundamental quality characteristics of canned salmon to give a reliable index of quality. Such an index, in turn, will greatly simplify the work of establishing a scientifically sound grading plan for the various varieties of canned salmon. The results obtained at the laboratory during the past year thus represent a very considerable advance beyond any previous work.

QUALITY OF CANNED SALMON PACKED DURING 1937

As mentioned in last year's annual report, a quality characteristic of a given manufactured product consisting of a number of similar units can only be accurately specified by means of a distribution function. When the distribution function is normal, that is, when it is symmetrical around the mean and fulfils certain other conditions, the quality characteristic can be specified by the arithmetic mean or average and the standard deviation. Even if the distribution varies widely from the normal type, the mean and standard deviation summarize fairly satisfactorily the essentials of the distribution. When considering data pertaining to the various quality characteristics of canned salmon it is essential, therefore, to note both the mean and standard deviation of the individual characteristics.

Another point which should be noted when considering the summaries of the distributions given in this report is that certain of these quality characteristics differ widely in nature from the remaining characteristics. The characters vacuum and net weight, for example, differ from the remaining (fundamental) characters of canned salmon in that they are not affected by seasonal variation. The variation in these characters is entirely a consequence of variations introduced during processing. Hence, in these instances, the salmon canner and the manufacturer of the salmon cans may be held directly responsible for any excessive variation in quality.

In the case of the fundamental characteristics of canned salmon, however, such as firmness, colour, etc., the variation is largely beyond the control of the canner and results mainly from the operation of factors which produce the seasonal trend in these characteristics. The means and standard deviations of the combined results of one year's examinations do not, therefore, give complete information regarding the quality of the season's pack. Such statistics represent the average over the whole season for the particular character in question and the total extent of the variation around that average. To give complete information regarding the average of the character it would be necessary to give the line of seasonal trend, and the true standard deviation of the character would be the standard deviation around the line of seasonal trend.

Table I shows that the vacuum occurring in samples packed during 1937 was similar to that found in samples packed during the preceding year. These data further confirm the fact that the average vacuum obtainable with the present cannery processes of filling and exhausting is dependent on the size and dimensions of the can in addition to other factors. When arranged in descending order of average vacuum the various can sizes follow the order: 1-pound talls, $\frac{1}{2}$ -pound flats, 1-pound flats and $\frac{1}{4}$ -pound flats. Similar data pertaining to the other species indicate that, as regards vacuum, the various varieties of canned salmon packed during 1937 received very similar treatment during filling and processing.

The data listed in table I emphasize again the conclusion reached in last year's annual report, namely, that this quality characteristic of British Columbia canned salmon could be still further improved. Certain lines along which improvements might be effected were indicated in the latter report and need not be repeated here. It may be worth while to mention, however, that a considerable proportion of the rather surprising variation in vacuum in the 1937 pack probably arises through lack of sufficient control of the net weight of the contents of the cans. Table II shows that there is a substantial variation in the net weight of canned sockeye salmon packed during the 1936 and 1937 seasons. In the case of the one-pound tall sockeye, for example, the data of table II show that during both these years there was a standard deviation in the net weight of this can size of nearly half an ounce. This wide variation in net weight appears to be due to lack of uniformity in the filling procedures followed by the different canners, because these distributions vary widely from the normal type and are therefore probably composite distributions consisting of a number of component normal distributions.

The twenty-five percentiles of these two distributions show that 75 per cent of the one-pound tall samples examined during these two years contained more than 16½ ounces, yet notwithstanding this excessive over-filling a number of the samples were under weight to the extent of 2 ounces, while the total range extended from about 14 ounces to 18.2 ounces in the case of the 1936 samples and 18.5 ounces in the case of the samples packed during 1937. The effort of the industry as regards net weight thus leaves much to be desired and probably accounts for a considerable proportion of the rather excessive variation in vacuum in British Columbia canned salmon.

In contrast with the vacuum data, the summaries of the distributions of softness of samples packed during 1937 (table III) show a general improvement in this quality characteristic in comparison with the corresponding figures for 1936. In most cases, however, the decreases in average softness are small. On the other hand, the improvement is so uniform that it is difficult to discover a satisfactory explanation of the phenomenon.

Any one, or all, of several factors might have brought about this decrease in softness of the 1937 samples. The decrease might, for example, be due to

an improvement in the quality of the salmon *per se*. Improvements in filling practice or in processing might also have contributed towards increasing the average firmness of the 1937 samples, or the improved results might be due to changes in the testing procedure itself. Only one subjective element, however, is introduced in carrying out the penetrometer tests, and this results from the way in which the operator adjusts the sample-holder to the upper surface of the sample. In view of the simplicity of the operation it hardly seems probable that the examiner would vary this adjustment materially from year to year.

The effect of this subjective element, however, in carrying out the penetrometer tests is being investigated. If variations in this adjustment are found to introduce substantial variations in average softness, these will be eliminated so that in future the distributions of softness (or firmness) will be rigidly comparable.

Table IV shows that, as regards the intensities of the red and yellow colours of the flesh, the samples of canned salmon packed during 1937 were very similar to those packed during the preceding season. The distributions of intensities of the yellow colour of the flesh were, in fact, practically identical with those derived from the 1936 data. In the case of the red colour, however, the averages are throughout slightly lower than those of the previous year and, by virtue of the general uniformity in the discrepancies, lead one to suspect that the latter are not necessarily the result of genuine changes in the intensities of the red colour of the flesh of the salmon packed during 1937, as compared with that packed during the preceding year, but may have arisen partly through changes in the procedure followed in carrying out the colour determinations. During 1936 the colour measurements carried out at the inspection laboratory were conducted in the presence of ordinary daylight, that is, ordinary skylight and sunlight, while during subsequent years these measurements have all been made with a standard daylight lamp as the light source. The 1937 data may not therefore be strictly comparable with the 1936 data, since sunlight and summer daylight contain a higher proportion of the red constituents than the north skylight reproduced by the standard lamp. The 1937 colour data will, of course, be accurately comparable with those of succeeding years, as, for example, the 1938 data, but, until the latter are available, it would not appear safe to infer that there was any substantial annual variation in this quality characteristic of British Columbia canned salmon.

Summaries of the distributions of total free oil in samples of twelve cans drawn from parcels packed during the 1937 season are shown in table V. For purposes of comparison the averages listed in table V are shown again in table VI below the corresponding averages derived from the 1936 data. As will be seen from table VI, an outstanding feature of the 1937 pack is the pronounced change in the amount of free oil in the 1937 samples as compared with the corresponding samples packed during 1936. In some instances the annual variation in this quality characteristic is of the order of 75 per cent. In the case of one-pound tall pink salmon, for example, table VI shows that the average free oil in samples of 12 one-pound tall cans of this series varied from 28.6 c.c. in 1936 to 49.0 c.c. in 1937, and in the latter year approached the average free oil in the one-pound tall sockeye salmon. The relative increase in the free oil content of the one-pound tall pink salmon in 1937 was therefore approximately 71 per cent. In addition, the total range in this character increased nearly 100 per cent in the 1937 data as compared with the 1936 data and the total range in this characteristic for one-pound tall pink salmon was considerably larger than the range covered by the corresponding sockeye data.

Analogous changes in this characteristic appear in the other varieties of canned salmon, although to a considerably less extent. In all cases, however, there is evidence of a substantial annual variation in the free oil content of canned salmon.

The data of table VII show that, for the most part, there were only slight variations in average total free aqueous liquor in samples of twelve cans drawn from parcels packed during 1937 as compared with the corresponding figures of the previous year. In the case of the one-pound tall sockeye salmon there appears to have been a slight increase in the average of this characteristic during 1937. Similar increases in the average of this quality characteristic are shown in one-pound tall samples of blueback, coho and pink salmon, while spring and chum show slight decreases in the amount of free aqueous liquid.

The 1937 averages for free oil and free aqueous liquor listed under "one-half-pound flats" are not, of course, comparable with the 1936 data owing to the reduction that was made in this can size at the beginning of the 1937 season.

The results shown in table VIII confirm the conclusion drawn in the annual report of the previous year regarding this quality characteristic of British Columbia canned salmon, namely, that there was a pronounced improvement in freshness in the 1937 pack relative to the 1936 pack, and definitely prove that it is economically feasible to pack salmon of a high grade of quality as regards freshness. The high standard of freshness achieved during 1937, unfortunately, does not appear to have been maintained during 1938. Complete figures for 1938 are not yet available, but the data that have been tabulated to date indicate that, in general, the industry has failed to maintain the gratifyingly high standard attained in the previous year.

In 1938 a further revision of the format of the combined application and laboratory report form of examination was undertaken, but owing to the fact that fundamental changes in the grading procedure are impending, especially in the case of grade A canned salmon, the proposed alterations in the routine report have been postponed. In addition to certain alterations in the columns appearing on the present form, the revised form included a brief explanation of the various quality characteristics of canned salmon that are dealt with in the routine examinations. These explanatory remarks, however, apply equally well to the present forms, hence it appears worth while to include them here pending the appearance of the revised form. The explanatory remarks are as follows:

BRIEF EXPLANATION OF QUALITY CHARACTERISTICS RECORDED IN LABORATORY REPORT OF EXAMINATION

(1) *Can. No.*—The numbers listed in this column refer to the individual cans in the sample. The data recorded on the line opposite any can number therefore refer to that particular can. For example, the code mark recorded opposite can No. 2 is the code mark found in this can. Similarly, the number in column 3 opposite can No. 2 gives the net weight of this can, etc.

(2) *Code.*—This refers to the mark embossed on the end of the can. By means of certain letters, figures and special marks the code mark shows the species of the salmon, the cannery where the salmon was packed and the date on which it was packed.

(3) *Net Weight.*—The number given in this column shows the weight in tenths of an ounce above or below the required gross weight of the can, that is, the legal weight of 16, 8 or 4 ounces, as the case may be, plus the average weight of the can.

(4) *Vacuum.*—The vacuum is expressed in inches of mercury at sea level and ordinary room temperature. For example, a vacuum of nine inches in a can of salmon shows that the pressure in the can is less than the atmospheric pressure by an amount equal to the pressure exerted by a column of mercury nine inches in height.

(5) *Softness*.—This characteristic is expressed in terms of depth of penetration of millimeters recorded by the Armstrong penetrometer under certain standard conditions. For practical purposes the softness of the sample may be taken as roughly equal to the depth of penetration; 25.4 millimeters = 1 inch.

(6) *Volume of Liquid*.—The number in this column gives the volume in cubic centimeters of aqueous or watery liquid recovered from the sample after the latter has been allowed to drain for five or ten minutes; 16.4 cubic centimeters = 1 cubic inch.

(7) *Volume of Oil*.—The numbers recorded in this column show the volume in cubic centimeters of the free oil separated out from the total liquid after the latter has been allowed to settle. The sum of the numbers in columns 6 and 7 gives the volume of the total drained liquids (oil and aqueous liquid). The volumes given in this and the preceding column usually refer to the free aqueous liquid or free oil in a sample of 12 cans.

(8) *Colour of Flesh*.—Columns 8 (a) and 8 (b) gives the red and yellow colours, respectively, of the flesh. The intensity of colour is expressed in Lovibond colour units.

(9) *Odour*.—The odour is estimated subjectively by the examiner and is described by means of the following letters: A = Good; B = Better than Average; C = Average; D = Poorer than Average; E = Poor; S = Stale; T = Tainted.

(10) to (14).—To indicate the presence in the sample of the characteristics recorded in these columns a vertical mark (1) or a check mark (✓) is employed in the line opposite the corresponding can number. For example, a series of 1's or check marks opposite can No's. 1 to 12 in column 12 (Watermarks) would indicate that the contents of every can in the sample of 12 contained watermarks.

Watermarks are various discolourations, usually pink and orange discolourations, that are found on the skin of salmon which has reached an advanced stage in the spawning migration. *Reddening of the Flesh* refers to the bacterial reddening that is often found along the ventral portion of the fish, around the fins, etc. The presence of this reddening usually indicates very stale or tainted salmon. *Poor Filling* indicates unsatisfactory filling of the can. Ordinarily, if the can contains more than three pieces of salmon, or if it is cross-filled, it may be regarded as a poorly filled can. Similarly, the sample has been given *Poor Cleaning*, if there are evidences of viscera in the sample or blood along the vertebral column. *Bruises and Pugh Marks* are undesirable, not only from the standpoint of the appearance of the sample, but also from the fact that they usually form easy means of entrance for bacterial agencies into the uncooked salmon.

LECTURES ON INSPECTION METHODS

During the past year the industry has shown increased interest in the procedures followed by the laboratory in carrying out the routine examinations. In addition to the visits that were made by individual persons connected with the industry and by other individuals, the production managers, members of the scientific staffs, superintendents, cannery managers, etc., of two large companies visited the laboratory in February, 1938, for the purpose of observing the methods of inspecting canned salmon that are being followed here. The first of these groups visited the laboratory on February 16 and the second on

February 23. On both occasions the laboratory gave a demonstration and discussion of the routine methods of inspecting canned salmon that are being applied. The visitors expressed considerable interest in the work that is being done by the laboratory.

RESEARCH WORK

The investigations carried out at the inspection laboratory during 1938 have been directed largely towards utilizing more effectively the results of the routine examinations recorded on the laboratory reports of examination. Hitherto, no attempt has been made by the laboratory to combine the individual quality characteristics of canned salmon. The individual characteristics such as vacuum, softness, colour, etc., of the sample under examination have been shown in the form of average or total scores derived from some convenient sample size. Owing to the comparatively wide range in average quality of the present grade A salmon, however, it has become increasingly apparent that it would be advantageous to the industry to classify further the present grade A salmon into two, or possibly three, subgrades.

The problem of setting up a scientifically sound grading plan for this purpose, unfortunately, is not an easy one. One of the reasons for this is that such a plan must meet satisfactorily a wide variety of requirements. Some of the more important of these are:—

(a) The plan must be practical and therefore as simple as possible. Some method must therefore be found of combining effectively the various individual quality characteristics of canned salmon to give an index of quality.

(b) The plan should readily allow alterations in the weightings of the individual characteristics, that is, it should permit changes in the weights without undue calculations or additional tabulations.

(c) The plan should take into account the seasonal trend in average quality as indicated by the individual quality characteristics.

(d) The plan should take into consideration producer and consumer risks and effective levels.

(e) The plan should fulfil its primary function satisfactorily, that is, it should separate satisfactorily the superior from the inferior grade A salmon.

(f) The plan should also be readily adaptable to various sample sizes.

Owing to limitations of space and the highly technical character of the subject it is not possible to give in this report a detailed discussion of the foregoing grading problem. This problem, however, raises questions that are of intimate concern to the industry. Also, a knowledge of certain aspects of it leads to the clearer perception of the bearing of the firmness research on the problem of grading. It appears almost imperative, therefore, to include here a brief account of the essential ideas involved.

For the purpose of illustrating these ideas it will suffice to consider the simple case of a single normally distributed character of constant standard deviation, that is, a character whose variability around the mean remains unchanged. The distribution of the average (arithmetic mean) of a given sample, say 12, will therefore be normal. Also, as the average quality of the characteristic changes, the distribution of the average of samples of 12 will merely move horizontally to the right or left, as shown in figure 1. In the latter figure, X_c is the average of the distribution of averages of samples drawn from quality X_c . Similarly, X_p is the average of the distribution of averages

of samples drawn from quality X_p . If X_c and X_p are each three standard deviations from X_L , then under the above conditions the probability of drawing a sample of 12 from the quality X_c having an average equal to or greater than X_L is 0.00135.

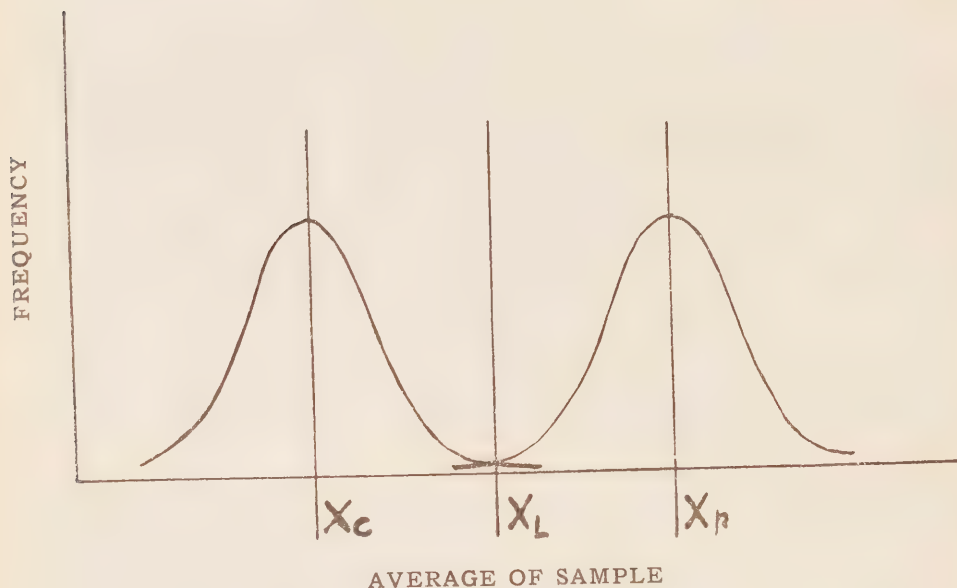


FIG. 1.—Producer's and consumer's effective levels corresponding to given producer's and consumer's and acceptance limit X_L for the average of the sample.

Consequently, if X_L is the acceptance limit for averages of 12, that is, if the examiner rejects the parcel whenever the average quality in samples of 12 is X_L or lower, then owing to sampling fluctuations the consumer will be called upon to accept a certain proportion of parcels of lower average quality than X_L . The lowest average quality of such parcels, and the proportion of such parcels, that he will be required to accept, however, are accurately specified by the average, X_c and the probability, $P_c=0.00135$, that is, by the consumer's effective level and consumer's risk. In this instance, the consumer would, in the long run, be asked to accept only about 13 out of every 10,000 of the parcels submitted for examination whose average quality was X_c or lower.

Similar reasoning evidently applies to the producer's risk and effective level. If, for example, the producer wishes to ensure that, in the long run, less than about 13 out of every 10,000 of the parcels he submits for examination will be rejected, then he will need to keep the quality of his product at the level X_p or higher under the preceding conditions of sampling and inspection.

From the preceding definitions of producer's and consumer's risks, it is evident that the limits bounding any given grade of quality X_1 to X_2 are in reality intervals or regions or uncertainty. In grading grade A canned salmon into two sub-grades or classes, for example, the limits defining one of these sub-grades, say A2, would be somewhat as shown in figure 2, under the above conditions of sampling and inspection. If the limits of grade A2 quality are L_1 and L_2 and the salmon canner wishes to ensure that certain parcels of his pack will pass as grade A1, then he would need to see that the quality of these parcels

was equal to or greater than L_p under the above conditions. Similarly, the consumer would be called upon to accept as grade A2 quality a certain proportion of parcels that were actually of grade B quality, but the lower limit of quality of such parcels would be L_c , corresponding to a sample of size 12 and the above consumer's risk.

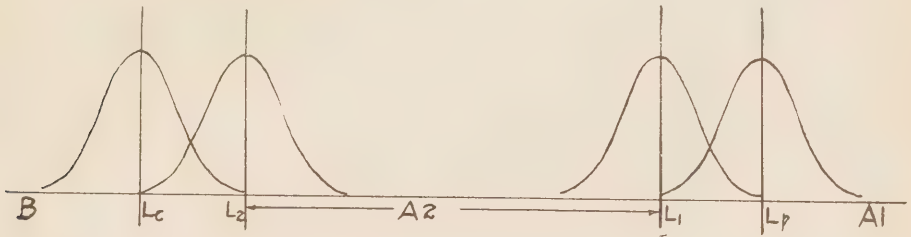


FIG. 2.—Effect of sampling fluctuations on the limits bounding any given grade of quality.

Owing to the effect of natural causes, however, the total range of grade A quality is fixed. Hence, if the sample size n is fixed, it may happen that it is not possible to classify grade A salmon into more than, say, two sub-classes or grades. The reason for this will be readily apparent on considering figures 3 and 4. Figure 3 illustrates the situation resulting from narrowing the interval of grade A2 quality so that the limits L_1 and L_2 are 6S (6 standard deviations) apart. In figure 4 the interval corresponding to A2 quality has been reduced to one-half this distance.

In all instances, of course, there is overlapping in adjacent grades. By bringing the limits L_1 and L_2 closer together, as in figures 3 and 4, this overlapping is considerably increased. In figure 3, however, there is still good segregation into distinct grades in the sense that it is possible to specify two values of average quality, say L_c and L_p , which do not appear simultaneously in the adjacent grades greater than the proportion of times given by the consumer's or producer's risk, providing the grades in which these two values of average quality appear have intervals that are not less than 6S, that is, providing that each of the intervals of the grades A1 and B in figure 3, for example, are not less than 6S. In the case of figure 4, it is not possible to specify such average qualities, if the grading intervals are all equal. Furthermore, in figure 4 there is overlapping in three adjacent grades, and if the grading interval A2 is further reduced, the proportion of times that the quality L_1 will be graded B under these circumstances will steadily become greater than 0.00135.

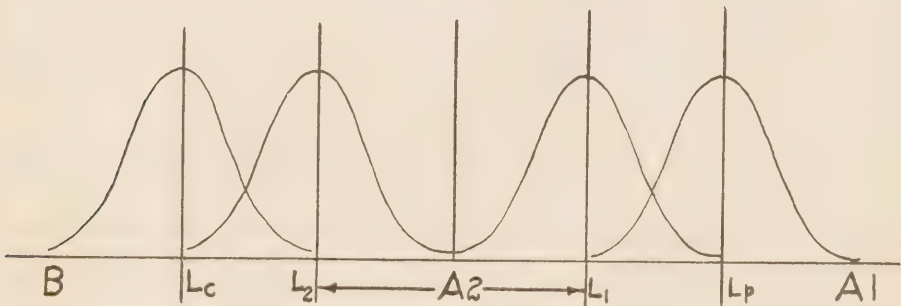


FIG. 3.—Diagram illustrating a sound practical grading plan.

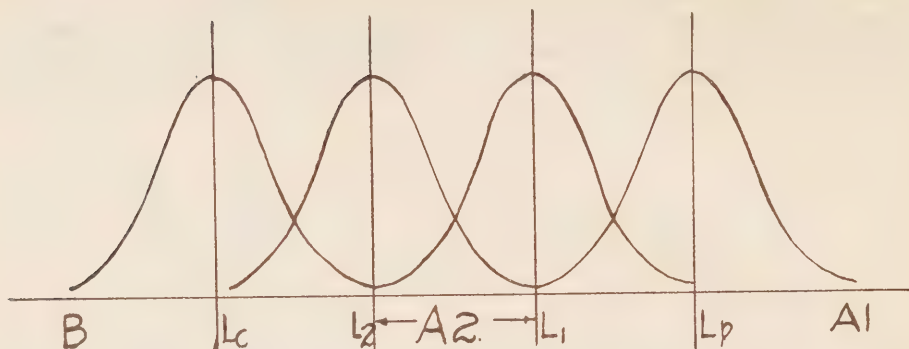


FIG. 4.—Diagram showing minimum requirements in a practical grading plan.

The purpose of grading, however, is to separate the good from the bad or the superior from the inferior. A grading plan that occasionally assigns the same quality to three adjacent grades cannot be said to fulfil this function satisfactorily. Hence, it would appear that the grading plan illustrated in figure 4 represents the minimum requirements for practical grading purposes. For the latter purpose, the distance between the acceptance limits L_1 and L_2 should be at least $3S$, and in a really satisfactory grading plan this distance should be equal to or greater than $6S$.

In the present stage of the grading investigation the best practical estimate of the standard deviation of a given quality characteristic for a given area appears to be the standard deviation s_t around the line of seasonal trend. In the case of the fundamental characteristics of canned salmon, however, the value of the standard deviation in quality, that is, the value of s_t , is not within the control of the salmon canner or examiner. Also, under the preceding conditions, the standard deviation of the average depends upon s_t and the size of sample inspected by the examiner. Consequently, under the above conditions the fineness of the grading ultimately depends upon the size of sample taken for examination.

Hitherto, the main difficulty encountered in applying the foregoing ideas to the grading of canned salmon has been to combine the individual characteristics effectively to give an index of quality. In order to set up an index of quality that is practical and reliable, and, at the same time, is capable of interpretation along the lines indicated above, it is essential that the individual quality characteristics be normally distributed. No difficulty would be experienced in combining satisfactorily the fundamental characteristics red and yellow colours of the flesh, total free oil and free aqueous liquid in samples of twelve, because these distributions, particularly around the line of seasonal trend, are closely normal and might safely be considered normal for all practical purposes. The distributions of softness (or firmness), however, vary widely from normal. Hence, it has not hitherto been practically feasible to include the latter quality characteristic in any proposed index of quality.

The importance of the firmness research that has been carried out at the laboratory during the past year lies in the fact that it has led to a normally distributed measure of this quality characteristic. The resulting measure of firmness can thus be readily combined with other quality characteristics of canned salmon. In addition, it will be possible in future, as a result of this work, to express the tolerances for firmness defining grade B salmon in the form of a coefficient of variation. As shown in last year's annual report, these

tolerances have previously been specified by the average of this character for the sample under examination and the rather unsatisfactory statistic fraction defective *p*. In future it will be possible to take into consideration accurately both the average and variability in this characteristic when differentiating between grade A and grade B salmon.

Work on the problem of incipient deterioration has been continued during the past year, but owing to the pressing nature of the grading investigation and closely relating problems only a limited amount of time was available for this work. No further investigation of seasonal or other changes in the pH of the aqueous liquid in canned salmon was carried out during the past year. Similarly, owing to lack of time, it was not possible to investigate further the extent of the reliability, if any, of the trimethylamine test in determining the amount of incipient deterioration in canned salmon. The limited time available for this research was employed in investigating the surface tension method of measuring acid values mentioned in last year's annual report. This work is being continued with a view to improving the reliability and rapidity of this method of measuring acid values and with the object of studying the possibilities of other means of determining the amount of hydrolysis in salmon oils.

During the past year difficulties were encountered in several instances in positively identifying species. The characteristics red and yellow colours of the flesh, total free oil, total free aqueous liquid, firmness, texture of the flesh tissue and odour are at present employed for this purpose. In view of the close similarities existing among certain of the species, however, and the serious overlapping in ranges of the individual characteristics which results from these similarities, it is occasionally almost impossible to establish positive identification of the species. In the coming year, therefore, it is the intention to collect data showing the extent of the differences in the unsaturations of the oils derived from the various species. These data, it is hoped, will make available a further characteristic on which to base the identification of the species.

The following publication appeared during 1938 and reports in part the investigation dealing with the measurement of firmness of canned salmon.

Charnley, F. and R. S. Bolton—*The Measurement of Firmness of Canned Salmon and Other Semi-Rigid Bodies by the Dynamic Penetrometer Method. I. Experiments with a Multiple-Needle Penetrometer.*—J. Fish. Res. Bd. Can. 4 (3) 1938.

TABLE I.—SUMMARY OF VACUUM MEASUREMENTS ON SAMPLES OF CANNED SOCKEYE SALMON INSPECTED BETWEEN JUNE 1, 1937 AND MAY 31, 1938

	1-lb. talls	$\frac{1}{2}$ -lb. flats	1-lb. flats	$\frac{1}{4}$ -lb. flats
Number of cans examined.....	1,395	6,818	1,672	192
Average vacuum (inches).....	9.57	7.01	5.40	5.68
Standard deviation (inches).....	3.11	3.01	3.05	2.60
Standard deviation of average of 12 cans.....	0.90	0.87	0.88	0.75
Range.....	pos. press. to 20 in.	pos. press. to 18 in.	pos. press. to 15 in.	pos. press. to 12 in.
Percentiles (inches):				
25%.....	7.52	4.98	3.31	3.92
50%.....	9.72	7.10	5.18	5.70
75%.....	11.71	9.16	7.50	7.39

Vacuum is expressed in inches of mercury. Atmospheric pressure at sea level=29.9 inches of mercury.

TABLE II.—SUMMARY OF DISTRIBUTIONS OF NET WEIGHT OF CANNED SOCKEYE SALMON

	1936-37		1937-38	
	1-lb. Talls	$\frac{1}{2}$ -lb. Flats	1-lb. Talls	$\frac{1}{2}$ -lb. Flats
N.....	2,605	7,442	1,394	6,832
M.....	16.75	8.66	16.86	8.47
S.....	0.48	0.29	0.46	0.27
S ₁₂	0.14	0.08	0.13	0.08
R.....	13.95-18.15	7.1-9.9	13.95-18.45	6.7-9.5
P:				
25%.....	16.48	8.47	16.38	8.29
50%.....	16.78	8.65	16.85	8.46
75%.....	17.07	8.85	17.16	8.64

N=Total number of tins examined; M=Average net weight (arithmetic mean) in ounces; S=Standard deviation of distribution of single tins; S₁₂=Standard deviation of average of 12 tins; R=Range in ounces; P=Percentiles.

TABLE III.—SUMMARY OF DISTRIBUTIONS OF SOFTNESS (TEXTURE) OF SAMPLES OF CANNED SALMON DRAWN FROM PARCELS INSPECTED BETWEEN JUNE 1, 1937 AND MAY 31, 1938.

ONE-POUND TALLS

	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
		(x)					
N.....	1,185	696	3,264	754	7,273	7,666	42
M.....	7.52	8.57	7.91	9.93	8.91	7.65	8.60
S.....	1.68	1.82	1.68	3.25	2.90	1.74	2.02
S ₁₂	0.48	0.53	0.48	0.94	0.84	0.50	0.58
R.....	4-16	5-16	4-20	5-26	4.5-40.5	4-25	6-15
P:							
25%.....	6.28	7.29	6.74	7.66	6.93	6.46	7.15
50%.....	7.24	8.24	7.64	9.17	8.64	7.38	8.28
75%.....	8.48	9.47	8.84	11.57	10.13	8.52	9.44

ONE-HALF POUND FLATS

N.....	5,257	437	2,625	971	4,297	2,654	164
M.....	7.53	8.68	8.39	10.06	9.54	8.22	8.48
S.....	1.52	1.60	1.72	3.20	2.87	2.07	2.15
S ₁₂	0.44	0.46	0.50	0.92	0.83	0.60	0.62
R.....	4-24	5-14	5-20	5-32	5-40	4-24	5-17
P:							
25%.....	6.46	7.59	7.16	7.88	7.71	6.77	7.00
50%.....	7.32	8.42	8.19	9.42	8.98	7.83	8.09
75%.....	8.36	9.42	9.30	11.30	10.64	9.26	9.50

N=Total number of tins examined; M=Average softness (arithmetic mean) in scale units; S=Standard deviation of distribution of single tins; S₁₂=Standard deviation of average of 12 tins; R=Range in scale units; P=Percentiles.

(x)=Immature Coho.

TABLE IV.—SUMMARY OF DISTRIBUTIONS OF COLOUR OF SAMPLES OF CANNED SALMON DRAWN FROM PARCELS INSPECTED BETWEEN JUNE 1, 1937 AND MAY 31, 1938.

RED

	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N.....	3,121	373	1,966	558	4,988	4,153	74
M.....	6.29	5.54	4.73	4.12	3.09	2.53	3.65
S.....	0.80	0.64	0.71	1.41	0.66	0.61	0.54
S ₆	0.33	0.26	0.29	0.58	0.27	0.25	0.22
R.....	2.0-9.5	3.5-7.0	1.0-7.5	1.0-8.5	1.0-5.0	1.0-4.5	2.5-5.0
P:							
25%.....	5.78	5.07	4.32	2.98	2.71	20.6	3.26
50%.....	6.29	5.50	4.77	4.40	3.16	2.54	3.58
75%.....	6.80	6.00	5.16	5.16	3.56	3.00	4.03

YELLOW

	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N.....	3,121	373	1,966	558	4,985	4,151	74
M.....	4.18	3.50	3.25	3.11	2.67	2.61	2.81
S.....	0.70	0.58	0.50	0.78	0.41	0.41	0.34
S ₆	0.29	0.24	0.21	0.32	0.17	0.17	0.14
R.....	2.0-7.0	2.5-5.0	2.0-5.0	1.0-6.0	1.5-4.0	1.5-4.0	2.0-3.5
P:							
25%.....	3.68	3.05	2.89	2.54	2.38	2.34	2.56
50%.....	4.21	3.47	3.19	3.02	2.66	2.60	2.87
75%.....	4.64	3.92	3.58	3.60	2.99	2.92	3.08

N=Total number of cans examined; M=Average colour (arithmetic mean) in Lovibond colour units; S=Standard deviation of distribution of single cans; S₆=Standard deviation of average of 6 cans; R=Range in Lovibond colour units; P=Percentiles.

TABLE V.—SUMMARY OF DISTRIBUTIONS OF TOTAL FREE OIL IN SAMPLES OF 12 CANS DRAWN FROM PARCELS OF CANNED SALMON INSPECTED BETWEEN JUNE 1, 1937 AND MAY 31, 1938.

ONE-POUND TALLS

	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N.....	116	61	297	46	952	955	2
M.....	53.8	31.8	34.7	102.3	49.0	10.4	162.5
S ₁₂	31.2	16.4	21.7	55.6	31.9	8.8	.....
R.....	0-167.5	2.5-82.5	0-105.0	17.5-277.5	0-207.5	0-67.5	120-205
P:							
25%.....	30.6	19.9	17.9	62.5	21.7	3.3	.....
50%.....	50.8	27.2	29.9	97.5	45.2	8.7	.....
75%.....	74.5	40.9	49.0	135.8	71.3	14.9	.....

ONE-HALF POUND FLATS

	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N.....	659	39	221	67	488	262	4
M.....	39.6	15.0	18.0	60.0	25.8	7.7	57.5
S ₁₂	22.1	7.8	10.4	26.6	15.8	5.2	.....
R.....	0-137.5	2.5-47.5	0-82.5	9.5-139.5	0-87.5	0-32.5	50-70
P:							
25%.....	24.5	9.9	10.5	41.3	13.6	3.1	.....
50%.....	36.4	13.5	17.0	55.8	23.8	7.6	.....
75%.....	49.0	17.2	22.7	78.9	35.8	10.8	.....

N=Number of samples of 12 examined; M=Average volume of free oil in 12 cans (c.c.); S₁₂=Standard deviation of free oil in 12 cans; R=Range in volume of free oil in 12 cans (C.c.); P=Percentiles.
16.4 c.c. (cubic centimeters)=1 cubic inch.

DEPARTMENT OF FISHERIES

TABLE VI.—COMPARISON OF AVERAGE TOTAL FREE OIL (C.C.) IN SAMPLES OF 12 ONE-POUND TALL CANS INSPECTED DURING THE 1936 AND 1937 SEASONS

	Sockeye	Blueback	Coho	Spring	Pink	Chum
1936.....	84.8	26.3	39.7	97.0	28.6	8.0
1937.....	53.8	31.8	34.7	102.3	49.0	10.4

TABLE VII.—SUMMARY OF DISTRIBUTIONS OF TOTAL FREE AQUEOUS LIQUOR IN SAMPLES OF 12 CANS DRAWN FROM PARCELS OF CANNED SALMON INSPECTED BETWEEN JUNE 1, 1937 AND MAY 31, 1938.

ONE-POUND TALLS

	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N.....	116	61	297	46	952	955	2
M.....	881.6	1,018.1	944.2	858.6	1,041.1	1,014.3	925.0
S ₁₂	104.6	63.8	90.8	132.8	172.4	105.8	.....
R.....	587-1,147	867-1,192	602-1,252	577-1,177	557-1,597	727-1,427	900-950
P:							
25%.....	809.7	971.8	887.4	783.8	917.0	942.2	.....
50%.....	876.9	1,015.0	946.9	843.8	996.3	1,005.1	.....
75%.....	947.5	1,048.8	996.4	922.5	1,142.7	1,077.2	.....

ONE-HALF-POUND FLATS

	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
N.....	659	39	221	67	488	262	4
M.....	393.1	473.1	441.2	400.1	460.2	463.2	367.5
S ₁₂	47.7	37.0	46.8	58.0	69.4	60.8	.....
R.....	227-602	402-562	322-672	242-567	227-717	317-667	320-410
P:							
25%.....	359.8	441.9	411.4	366.7	417.8	420.1	.....
50%.....	389.2	475.5	441.1	401.4	455.6	453.0	.....
75%.....	428.0	498.6	468.1	435.5	497.7	505.7	.....

N = Number of samples of 12 examined; M = Average volume of free aqueous liquor in 12 cans (c.c.); S₁₂ = Standard deviation of free aqueous liquor in 12 cans; R = Range in volume of free aqueous liquor in 12 cans (c.c.); P = Percentiles; 16.4 c.c. (cubic centimetres) = 1 cubic inch.

TABLE VIII.—FRESHNESS OF SAMPLES OF CANNED SALMON DRAWN FROM PARCELS PACKED BETWEEN JUNE 1, 1937 AND MAY 31, 1938.

	Sockeye	Blueback	Coho	Spring	Pink	Chum	Steelhead
Nc.....	277,068	18,164	112,492	15,869	561,500	442,275	838
Nt.....	9,790	1,497	8,040	2,045	19,488	17,016	224
Q.....	33	2	45	6	142	70	1
S.....	5	.....	15	1	12	4	.....
T.....	.....	.....	.....	.....	.....	.....	.....
%Q.....	0.337	0.134	0.560	0.293	0.729	0.411	0.446
%S.....	0.051	.....	0.186	0.049	0.062	0.024	.....
%T.....	.....	.....	.....	.....	.....	.....	.....

Nc = Number of cases represented by samples; Nt = Number of tins examined ($\frac{1}{2}$ -lb. flats and 1-lb. talls combined); Q = Number of questionable tins; S = Number of stale tins; T = Number of tainted tins; %Q = Percentage questionable tins; %S = Percentage stale tins; %T = Percentage tainted tins.

APPENDIX No. 7

SUMMARY OF EXPENDITURE AND REVENUE BY PROVINCES, OF THE FISHERIES
SERVICE 1867-1938-39, UNDER THE DOMINION GOVERNMENT

	Expenditure	Revenue
	\$ cts.	\$ cts.
Nova Scotia.....	8,086,320 52	465,389 10
Prince Edward Island.....	1,421,371 24	149,268 63
New Brunswick.....	5,781,983 28	675,798 84
Quebec.....	2,788,460 01	343,304 70
Ontario.....	3,590,830 13	520,245 81
Manitoba and Northwest Territories.....	23,414 29	4,779 25
Manitoba.....	1,764,559 68	334,589 81
Northwest Territories.....	58,258 58	9,785 23
Alberta.....	518,428 96	226,736 41
Saskatchewan.....	576,342 37	101,945 16
British Columbia.....	17,279,370 92	2,937,810 80
Yukon.....	29,343 94	15,667 75
Hudson Bay District.....		821 83
	\$41,918,683 92	\$5,786,143 32
Cruisers Nova Scotia, Prince Edward Island, New Brunswick.....	6,407,799 56	
Expenditure, General.....	5,914,288 49	
Fishing Bounty.....	9,028,122 76	
	\$63,268,894 73	

DEPARTMENT OF FISHERIES

FINANCIAL STATEMENT

1938-39

Vote No.	Appropriation	Amount	Expenditure
		\$ cts.	\$ cts.
78	(Salaries and Disbursements of Fishery Officers and Guardians.....)	1,000,000 00	524,350 21
	(Fisheries Patrol Service.....)		244,625 96
	(Fisheries Protection Service.....)		197,272 39
			966,248 56
79	Building Fishways and Clearing Rivers.....	9,000 00	3,968 80
80	Development of Deep Sea Fisheries and the Demand for Fish.....		
81	Fish Culture.....	62,000 00	54,059 29
82	Oyster Culture.....	240,740 00	233,408 21
84	International Fisheries Commission (Halibut).....	24,000 00	22,115 32
83	Fisheries Research Board of Canada.....	25,000 00	24,171 42
87	To provide for payment of a bounty for the destruction of harbour seals.....	240,000 00	239,877 49
88	International Pacific Salmon Fisheries Commission.....	30,000 00	22,375 00
85	Grant to United Fishermen's Association.....	25,000 00	20,979 67
86	Grants to Fisheries Exhibitions:—	3,000 00	3,000 00
	Nova Scotia Exhibition, Lunenburg.....	1,800 00	1,800 00
	Pictou Lobster Carnival.....	500 00	500 00
Supp. 510	To provide for the replacement of Fisheries service vessels	150,000 00	140,878 10
Supp. 511	To enable aiding Fishermen, Groups of Fishermen and others to establish or better establish themselves in the industry.....		
Statute	Miscellaneous Civil Service Gratuities.....	500,000 00	399,590 34
Supp. 512	To aid in expanding the sale of the products of the Canadian fishermen in foreign and domestic markets.....	760 00	760 00
Supp. 490	For the purposes of the purchase and shipment of dried fish to the International Commission for the assistance of Child Refugees in Spain.....	135,000 00	133,031 01
Statute	Fishing Bounty.....	10,000 00	9,779 10
Statute	Exchequer Court Award— <i>re</i> W. E. Kelly.....	159,982 70	159,982 70
		4,243 15	4,243 15
77	Departmental Administration.....	2,621,025 85	2,440,768 16
Statute	Minister's Salary and Car Allowance.....	124,800 00	115,675 56
		12,000 00	12,000 00
		2,757,825 85	2,568,443 72
	(Pacific Halibut Treaty Special Account (Finance Department).....)		13,663 40
	(Pacific Salmon Treaty Special Account (Finance Department).....)		7,567 54
			2,589,674 66

* Balance due by United States Government on account of divisible expenditure for Fiscal Year 1938-39.

FISHERIES

STATEMENT OF REVENUE RECEIVED DURING THE FISCAL YEAR 1938-39

Class	Total	Gen.Acct.	N.S.	P.E.I.	N.B.	Que.	Ont.	B.C.	Yukon
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Fisheries Revenue.....	52,281 15		11,356 00	2,820 77	10,542 25	264 50	2 00	26,815 63	480 00
Fines and Forfeitures.....	11,602 19		662 30	222 80	331 79			10,385 30	
Casual Revenue.....	8,884 92	516 68	2,630 30	5,207 40	51 90	42 40		436 24	
Fish Culture Revenue.....	408 50			50 00	358 50			171 00	
Modus Vivendi.....	245 00		74 00						
Pelagic sealing Revenue	39,355 17	39,355 17							
Premium, Discount and Exchange.....	1 43			30				1 13	
	112,778 36	39,871 85	14,722 60	8,301 27	11,284 44	306 90	2 00	37,809 30	480 00

SALARIES AND DISBURSEMENTS OF FISHERY OFFICERS
EXPENDITURE 1938-39 AND SUMMARY*Nova Scotia—*

Head Office.....	\$ 24,880 13	
District No. 1.....	42,946 11	
District No. 2.....	55,478 58	
District No. 3.....	61,033 97	
	<hr/>	184,338 79

Prince Edward Island—

District No. 1.....	28,883 03	
District No. 2 (Mag'n. Island, Que.).....	6,425 37	
	<hr/>	35,308 40

New Brunswick—

District No. 1.....	28,042 81	
District No. 2.....	64,335 06	
District No. 3.....	37,878 44	
	<hr/>	130,256 31

<i>General East</i>		11,876 16
---------------------------	--	-----------

British Columbia—

Head Office.....	28,203 72	
District No. 1.....	32,802 01	
District No. 2.....	37,867 72	
District No. 3.....	44,185 26	

<i>Canned Salmon Inspection</i>	12,471 27	
---------------------------------------	-----------	--

<i>General West</i>	7,040 57	
	<hr/>	162,570 55
		<hr/>
		\$ 524,350 21

SUMMARY

Nova Scotia.....	\$ 190,595 46	
Prince Edward Island.....	29,863 35	
New Brunswick.....	134,677 38	
Quebec.....	6,643 47	
British Columbia.....	162,570 55	
	<hr/>	\$ 524,350 21

DEPARTMENT OF FISHERIES

FISHERIES PATROL SERVICE—EXPENDITURE 1938-39 AND SUMMARY

Nova Scotia—

District No. 1—		
Chartered Boats.....	\$	974 30
District No. 2—		
Departmental Boats.....		11,446 79
Chartered Boats.....		4,290 84
General.....		132 28
District No. 3—		
Departmental Boats.....		11,273 76
Chartered Boats.....		1,208 50
General.....		974 68
		<hr/> \$ 30,301 15

Prince Edward Island—

District No. 1—		
Departmental Boats.....		3,582 78
Chartered Boats.....		8,865 30
		<hr/> 12,448 08

New Brunswick—

District No. 1—		
Departmental Boats.....		10,484 50
District No. 2—		
Departmental Boats.....		1,676 73
Chartered Boats.....		15,844 75
General.....		26 04
		<hr/> 28,032 02

British Columbia—

District No. 1—		
Departmental Boats.....		18,913 33
Chartered Boats.....		863 42
General.....		105 02
District No. 2—		
Departmental Boats.....		39,822 15
Chartered Boats.....		29,502 60
Speed Boats.....		147 57
District No. 3—		
Departmental Boats.....		27,114 90
Chartered Boats.....		28,827 84
Digby Island.....		6,056 09
Poplar Island.....		2,764 58
Air Service.....		19,727 21
		<hr/> 173,844 71
		<hr/> \$ 244,625 96

SUMMARY

Nova Scotia.....	\$	30,301 15
Prince Edward Island.....		12,448 08
New Brunswick.....		28,032 02
British Columbia.....		173,844 71
		<hr/> \$ 244,625 96

FISHERIES PROTECTION SERVICE EXPENDITURE SUMMARY FOR 1938-39

East Coast.....	\$	86,014 02
West Coast.....		111,258 37
		<hr/> \$ 197,272 39

FISH CULTURE EXPENDITURE 1938-39 AND SUMMARY

	Con- struction	Mainte- nance and Operation	Total by Hatcheries	Total by Provinces
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
NOVA SCOTIA				
Administration.....		12,570 71	12,570 71	
Antigonish.....		13,978 68	13,978 68	
Bedford.....		4,875 57	4,875 57	
Cobequid.....		9,047 44	9,047 44	
Coldbrook Ponds.....		2,926 65	2,926 65	
Grand Lake Ponds.....		5,081 21	12,442 17	
Lindlof.....	7,360 96	4,016 95	18,135 00	
Margaree.....	14,118 05	11,283 93	11,291 93	
Margaree Ponds.....	8 00	2,762 14	2,762 14	
Middleton.....		6,525 85	6,525 85	
Nictaux Pond and Rearing Station.....		1,201 88	1,201 88	
River Phillip Ponds.....		788 79	788 79	
Sackville River Ponds.....		453 42	453 42	
Yarmouth.....		6,878 23	6,878 23	
Kejimikujik Pond.....		4,769 88	4,769 88	
Mersey River Pond No. 3.....		961 15	961 15	
	21,487 01	88,122 48		109,609 49
PRINCE EDWARD ISLAND				
Kelly Pond.....		4,044 83	4,044 83	
Morrell River Pond.....		695 06	695 06	
Cardigan Rearing Ponds.....		5,489 86	5,489 86	
		10,229 75		10,229 75
NEW BRUNSWICK				
Florenceville.....		9,597 54	9,597 54	
Grand Falls.....		7,067 57	7,067 57	
Miramichi.....		6,902 29	6,902 29	
Miramichi Pond.....		1,420 55	1,420 55	
New Mills Pond.....		3,856 57	3,856 57	
Charlo (New Hatchery, Restigouche County).....	40,968 44	2,010 41	42,978 85	
Restigouche.....		3,404 73	3,404 73	
St. John.....		13,460 61	13,460 61	
St. John Pond.....		6,482 84	6,482 84	
	40,968 44	54,203 09		95,171 53
Supervisors, Engineers and Staff—East.....			8,308 18	8,308 18
General Account—East—				
Chamcook Lake, N.B.....		135 54	135 54	
Miscellaneous.....	9 09	8,462 61	8,471 70	
	9 09	8,598 15		8,607 24
BRITISH COLUMBIA				
General Account—				
Nelson Hatchery.....		57 50	57 50	
Anderson Lake Hatchery.....		693 50	693 50	
Cultus Lake Hatchery.....		561 29	561 29	
Miscellaneous.....		169 73	169 73	1,482 02
				233,408 21

SUMMARY

Nova Scotia.....	\$ 118,077 00
Prince Edward Island.....	10,965 45
New Brunswick.....	102,883 74
British Columbia.....	1,482 02
	\$ 233,408 21

DEPARTMENT OF FISHERIES

CONSERVATION AND DEVELOPMENT OF DEEP-SEA FISHERIES
EXPENDITURE 1938-39

Aids in Expending Demands for Fish.....	\$10,405 85
Educational Work	13,959 23
Educational Work Through Extension Department of St. Francis Xavier College	6,176 13
Bait Collection Service, N.S.....	574 50
Destruction of Sea Lions, B.C.....	281 35
Transshipment of Fur Seal Skins, B.C.....	2,934 84
Fisheries Intelligence Bureau	3,565 02
Advertising	3,396 60
Fish Collection Boat, N.S.....	4,439 99
Shrimp Investigation, P.E.I.	785 55
Miscellaneous	3,847 02
North American Council	336 40
Grant to <i>Bluenose</i>	2,500 00
London Conference <i>re</i> Salt Cod Fish.....	836 81
	<hr/>
	\$54,059 29
	<hr/>

FISHERIES RESEARCH BOARD OF CANADA EXPENDITURE
1938-39

<i>St. Andrews Biological Station, N.B.</i>	54,284 58
<i>Nanaimo Biological Station, B.C.</i>	60,722 38
<i>Gaspe Experimental Station, Quebec</i>	16,586 98
<i>Halifax Experimental Station, N.S.</i>	42,376 89
<i>Prince Rupert Experimental Station, B.C.</i>	41,440 44
<i>General Account</i>	24,466 22
	<hr/>
	\$239,877 49
	<hr/>

FISHERIES EXPENDITURE 1938-39 BY PROVINCES

Appropriation	General		Nova Scotia		Prince Edward Island		New Brunswick		Quebec		Ontario		Manitoba		Saskatchewan		Alberta		British Columbia		Total	
	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.
Salaries and disbursements, fishery officers and guardians.....			190 301 53		29 973 65		134 342 51		7 161 97						308 95		167 00		182 570 55		524 350 21	
Fisheries Patrol Service.....			30 301 15		12 448 08		28 032 02												173 844 71		244 025 96	
Fisheries Protection Service.....			77 648 28		6 951 81		1 413 93												111 258 37		197 272 39	
Building fishways and clearing rivers.....		16 82	328 13				4 37												3 619 48		3 968 80	
Development of the Deep Sea Fisheries and the demand for fish.....		6 061 39	18 005 18		2 391 28		11 892 05		6 631 70		3 123 02		590 84						4 887 28		54 059 29	
Fish culture.....			118 325 43		11 069 79		102 590 97												1 482 02		233 408 21	
Oyster culture.....			5 378 90		16 702 23		34 19												22 115 32		22 115 32	
International Fisheries Commission (Halibut).....																			24 171 42		24 171 42	
Fisheries Research Board of Canada.....																			102 162 82		239 877 49	
To provide for the payment of a bounty for the destruction of harbour seals.....		24 466 22	42 376 89				54 284 58		16 586 98													
International Pacific Salmon Fisheries Commission.....			5 267 50		4 180 00		1 505 00												11 422 50		22 375 00	
Grant to United Maritime Fishermen's Association.....																			20 979 67		20 979 67	
Grants to Fisheries Exhibitions—			1 000 00		1 000 00		1 000 00														3 000 00	
Nova Scotia Exhibition—Lunenburg.....			1 800 00																		1 800 00	
Pictou Lobster Carnival.....			500 00																		500 00	
To provide for the replacement of fisheries service vessels.....			3 271 80																			
To enable aiding fishermen, groups of fishermen and others to establish or better establish themselves in the industry.....																						
To aid in expanding the sale of the products of the Canadian fishermen in foreign and domestic markets.....			119 712 46		81 818 84		56 958 50		140 634 84										137 606 80		140 878 10	
For the purposes of the purchase and shipment of dried fish to the International Commission for the assistance of child refugees in Spain.....		4 000 06									129 031 01								465 70		399 590 34	
Miscellaneous Civil Service gratuities.....			460 00				300 00														9 779 10	
Fishing bounty.....		9 779 10	81 862 95		14 991 05		21 344 60		41 784 10										760 00		159 982 70	
Exchequer Court award <i>re</i> W. E. Kelly.....					4 243 15																4 243 15	
	44 323 53		696 539 70		185 709 88		413 702 72		212 799 59		132 154 63		590 84		308 95		167 00		754 471 32		2 440 768 16	
Departmental Administration.....																					115 675 56	
Minister of Fisheries, salary and car allowance.....																					12 000 00	
*Special account Halibut (Finance Dept.).....																					2 568 443 72	
*Special account Pacific Salmon Commission (Finance Dept.).....																					13 663 40	
																					7 567 54	
																					2 589 674 66	

NOTE.—*Balances due Canada on divisible expenses at the close of the fiscal year 1938-39 by United States Government.

APPENDIX No. 8

The following is a statement of the various kinds of licences issued by the supervisors in their respective districts, during the 1938-39 season:—

MAGDALEN ISLANDS, QUEBEC—ACTING SUPERVISOR J. J. LARABEE

Kind of Licences	Number of Licences Issued
Lobster fishing	767
Certificates of identification—Nil	
Licences to can lobsters	11
Certificates under section 53—Nil	
Herring seine	18
Herring trap-net	23 (6 cod trap-nets)
Smelt gill-net	104 (1 cancelled)
Smelt bag-net or box-net	6
	<hr/> 929 (1 cancelled)

PRINCE EDWARD ISLAND—ACTING SUPERVISOR J. J. LARABEE

Lobster fishing	2,521
Certificates of identification—47	
Licences to can lobsters	66 (1 cancelled)
Oyster fishery	70
Quahaug fishery	101
Certificates under section 53—5	
Lobster pound	Nil
Trap-net fishing	4
Salmon trap-net or pound-net	1
Set salmon gill-net	5
Gaspereau gill-net permits	11
Permits to authorize fishing for oysters in certain contaminated areas	129
Scallop fishery	Nil
Smelt gill-net	151
Smelt bag-net or box-net	213
	<hr/> 3,272 (1 cancelled)

NOVA SCOTIA—DISTRICT No. 1—SUPERVISOR A. G. McLEOD

Lobster fishing	2,899
Certificates of identification—5	
Licences to can lobsters	24
Oyster fishery	181
Certificates under section 53—165	
Trap-net fishing	38
Salmon trap-net, pound-net or weir	233
Special angling permits	174
Set salmon gill-net	57
Gaspereau fishing	Nil
Scallop fishery	Nil
Smelt bag-net or box-net	37
Smelt gill-net	122
	<hr/> 3,765

NOVA SCOTIA—DISTRICT No. 2—SUPERVISOR E. D. FRASER

Lobster fishing	4,350
Certificates of identification—210 (5 cancelled)	
Licences to can lobsters	39
Oyster fishery	363
Quahaug fishery	42
Certificates under section 53—83 (1 cancelled)	
Lobster pound	5
Seine	122
Licences to a captain of a Canadian fishing vessel (using an otter or other trawl)	3
Herring weir	19
Trap-net fishing	101

NOVA SCOTIA—DISTRICT No. 2—SUPERVISOR E. D. FRASER—*Concluded*

Kind of Licences	Number of Licences Issued
Salmon drift-net	54
Salmon trap-net, pound-net or weir.....	178
Special angling permits	207 (5 complimentary)
Set salmon gill-net	361
Smelt dip-net fishing permits.....	347
Shad gill-net or drift-net.....	84
Scallop fishery	3
Smelt bag-net or box-net.....	184
Smelt gill-net	184
Lobster pound certificates—198	
Interim receipts—Nil	
	<hr/> 6,646 (5 complimentary)

NOVA SCOTIA—DISTRICT No. 3—SUPERVISOR H. H. MARSHALL

Lobster fishing	3,753 (1 cancelled)
Certificates of identification—31 (1 cancelled)	
Licences to can lobsters	Nil
Certificates under section 53—184	
Lobster pound	8
Herring weir	52
Trap-net fishing	167
Salmon drift-net	3
Salmon trap-net, pound-net or weir.....	34
Salmon net permits (Medway river).....	23
Special angling permits	550 (1 cancelled)
Set salmon gill-net	426
Shad gill-net or drift-net	Nil
Smelt dip-net fishing permits	Nil
Scallop fishery	111
Smelt bag-net or box-net	18
Smelt gill-net	53
Permit for scientific purposes.....	1
Lobster pound certificates—764 (2 cancelled)	
	<hr/> 5,199 (2 cancelled)

NEW BRUNSWICK—DISTRICT No. 1—SUPERVISOR J. F. CALDER

Lobster fishing	172
Certificates of identification—19	
Lobster pound	5
Certificates under section 53—9	
Herring weir	538 (1 cancelled)
Clam permits	264
Salmon gill-net or drift-net	108
Herring seine	8
Shad gill-net or drift-net	38
Scallop fishery	9
Smelt gill-net	1
Smelt bag-net or box-net	Nil
Lobster pound certificates—1,519	
Lease of Dark Harbour fishing privileges—1	
Lease of Beals Eddy Pond fishery—1	
	<hr/> 1,143 (1 cancelled)

NEW BRUNSWICK—DISTRICT No. 2—SUPERVISOR A. L. BAREY

Lobster fishing	3,384 (4 cancelled and 11 free)
Certificates of identification—82	
Licences to can lobsters	76
Oyster fishery	1,252 (3 free)
Quahaug fishery	98
Certificates under section 53—233	
Lobster pound	5
Herring weir	Nil
Gaspereau pound-net or trap-net	83
Salmon gill-net or drift-net	188
Salmon trap-net, pound-net or weir.....	384
Special angling permits (black salmon).....	31 (3 cancelled)
Tomcod trap-net	6
Shad gill-net or drift-net	Nil

NEW BRUNSWICK—DISTRICT No. 2—SUPERVISOR A. L. BARRY—*Concluded*

Kind of Licences	Number of Licences Issued
Permits, authorizing the catching of pickerel, suckers, chub, perch and other coarse fish.....	9
Bass fishery	Nil
Smelt gill-net	429
Smelt bag-net or box-net	6,165 (1 cancelled and 46 free)
Loyster pound certificates—746	
	12,110 (8 cancelled and 60 free)

NEW BRUNSWICK—DISTRICT No. 3—SUPERVISOR L. H. PARKS

Sturgeon fishery	6
Salmon net permits (St. John river).....	81 (2 cancelled)
Gaspereau pound-net or trap-net.....	1
Salmon gill-net or drift-net	130
Salmon trap-net, pound-net or weir.....	98
Special angling permits (black salmon).....	976
Gaspereau gill-net	183
Shad dip-net fishing permits	99
Pickeral permits (net fishing).....	2
Whitefish gill-net permits (Grand Lake-Chiputneticook System)....	49
Shad gill-net or drift-net	206
Permits authorizing the catching of pickerel, suckers, chub, perch and other coarse fish.....	84
Bass fishery	24
Smelt bag-net or box-net	Nil
Pickeral permits (hook and line).....	132
Interim receipts—43	
	2,071 (2 cancelled)

PROVINCE OF BRITISH COLUMBIA—CHIEF SUPERVISOR J. A. MOTHERWELL

Special angling permits (seasonal)	37 (2 cancelled)
Anglers day permits for non-residents.....	56
Indian permits	1,694 (1 cancelled)
Crab fishery	107 (1 cancelled)
Smelt or sardine fishery	54 (2 cancelled)
Miscellaneous	93 (3 cancelled)
Salmon fishery licences for gill-net or drift-net.....	5,809 (78 cancelled)
Salmon trolling	3,385 (11 cancelled)
Salmon trap-net	5
Salmon purse-seine	301 (1 cancelled)
Salmon drag-seine	9
Licences to a captain of a salmon purse-seine boat.....	177
Grayfish fishery	488
Licences to assist operators of salmon (purse or drag) seines.....	1,763 (1 cancelled)
Licences to assistants in a boat used in operating a salmon gill-net or drift-net	548 (43 cancelled)
Cod fishery	435 (15 cancelled)
Whaling	6
Licences to captain of a Canadian halibut fishing boat, etc.....	10
Small dragger	43
Herring gill-net or drift-net	26
Herring purse-seine	44
Pilchard purse-seine	29
Licences to a captain of a herring purse-seine boat.....	28
Permit for scientific purposes	1
Licences to a captain of a pilchard purse-seine boat.....	23
Licences to assistant operators of herring purse-seine.....	399
Licences to assistant operators of pilchard purse-seine.....	177
Herring pound permits	7
Pelagic sealing certificates—15	
	15,754 (158 cancelled)

YUKON DISTRICT

Special fishery	23
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PACIFIC COAST

Licences to United States halibut fishing vessels.....	171
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ATLANTIC COAST

Kind of Licences	Number of Licences Issued
Licences to United States fishing vessels.....	72

NORTHWEST TERRITORIES

Reduction works	Nil	
Walrus	23	(incomplete)
Special angling (Hudson Bay and James Bay).....	Nil	
	<u>23</u>	

HUDSON BAY AND JAMES BAY

Experimental commercial fishing permit (James Bay).....	1	
Permits for scientific purposes.....	4	
	<u>5</u>	
Total	51,183	(173 cancelled)
		5 complimentary
		60 free)
	<u><u>51,183</u></u>	

APPENDIX No. 9

COMPARATIVE STATEMENT OF LOBSTER FISHING LICENCES
FROM 1928

PRINCE EDWARD ISLAND AND MAGDALEN ISLANDS

Year	Magdalen Islands	Prince County	Kings County	Queens County	Kings and Queens (Southern portion)	Totals
1928.....	682	925	616	337	.....	2,560
1929.....	659	857	509	271	.....	2,296
1930.....	644	922	573	285	.....	2,424
1931.....	526	894	521	283	.....	2,224
1932.....	526	1,409	308	402	398	3,043
1933.....	599	1,359	324	438	485	3,205
1934.....	825	1,190	483	459	542	3,499
1935.....	931	1,110	538	487	591	3,657
1936.....	984	972	580	536	609	3,681
1937.....	973	1,060	594	417	588	3,632
1938.....	767	1,035	539	396	551	3,288

NOVA SCOTIA—DISTRICT No. 1

Year	Inverness County	Richmond County	Cape Breton County	Victoria County	Totals
1928.....	537	648	462	376	2,023
1929.....	501	636	435	329	1,901
1930.....	496	682	442	343	1,963
1931.....	473	745	458	367	2,043
1932.....	542	897	578	426	2,443
1933.....	656	1,092	773	534	3,055
1934.....	701	1,060	790	561	3,112
1935.....	738	1,026	691	503	2,958
1936.....	845	948	886	506	3,185
1937.....	796	1,028	784	473	3,081
1938.....	738	883	823	455	2,899

NOVA SCOTIA—DISTRICT No. 2

Year	Halifax Office	Halifax County	Patrol Boat	Guys- boro County	Antig- onish County	aPictou and Col- chester	aCum- berland County	bHants, Col- chester and Cum- berland County	Totals
1928....	183	976	41	1,021	334	521	171	17	3,264
1929....	153	767	435	1,047	283	358	221	7	3,271
1930....	131	1,135	204	1,087	308	349	255	9	3,478
1931....	142	1,200	170	1,139	273	352	299	15	3,590
1932....	105	1,364	14	1,330	339	462	399	14	*4,029
1933....	68	1,453	59	1,439	350	526	374	18	4,287
1934....	20	1,342	24	1,489	425	589	431	22	4,342
1935....	5	1,435	24	1,473	494	685	426	7	4,549
1936....	1	1,460	.....	1,563	506	732	420	10	4,698
1937....	Nil	1,429	Nil	1,524	567	654	306	18	4,498
1938....	Nil	1,345	Nil	1,495	461	655	380	14	4,550

a Northumberland Straits side.

b Bay of Fundy side.

* The 1932 total includes two licences issued by the District Supervisor.

NOVA SCOTIA—DISTRICT No. 3

Year	Lunen- burg	Queens	Shel- burne	Yar- mouth	Digby	Kings	Anna- polis	Totals
1928.....	563	329	966	827	470	25	119	3,299
1929.....	472	217	850	792	463	27	120	2,941
1930.....	504	250	854	768	483	28	135	3,022
1931.....	590	296	1,016	770	430	.....	128	3,230
1932.....	491	290	965	673	312	.....	148	2,879
1933.....	525	262	1,112	720	415	21	141	3,196
1934.....	481	287	1,014	705	354	24	114	2,979
1935.....	562	307	1,100	758	370	21	85	3,203
1936.....	550	304	1,058	831	368	23	90	3,224
1937.....	692	398	1,190	972	384	37	113	3,786
1938.....	617	298	1,128	1,135	438	32	104	3,752

NEW BRUNSWICK—DISTRICT No. 1

Year	Charlotte	Saint John	Albert and West- morland	Totals
1928.....	433	86	1	520
1929.....	360	53	1	414
1930.....	288	57	2	347
1931.....	281	45	4	330
1932.....	380	101	2	483
1933.....	271	99	1	371
1934.....	*299	94	1	394
1935.....	*362	87	1	450
1936.....	408	85	1	494
1937.....	380	81	2	463
1938.....	95	71	6	172

NEW BRUNSWICK—DISTRICT No. 2

Year	Northum- berland County	Resti- gouche County	Gloucester County	Kent County	West- morland County	Totals
1928.....	297	50	517	501	249	*1,981
1929.....	289	43	406	583	188	*1,834
1930.....	319	46	794	638	327	2,124
1931.....	300	54	647	765	326	2,192
1932.....	394	67	933	997	435	2,826
1933.....	407	77	1,041	989	720	3,234
1934.....	512	74	1,064	1,087	905	3,642
1935.....	509	80	986	1,035	719	3,329
1936.....	503	73	1,091	1,033	619	3,269
1937.....	526	60	1,084	1,008	696	3,774
1938.....	523	54	1,084	1,015	708	3,384

* The 1928 total includes 367 licences issued by the District Supervisor, the 1929 total 325 licences, the 1934, 3 licences, and 1935 1 licence, so issued.

NOTE.—Cancelled licences are not included in the figures in this appendix.

Zool.

Zool.

